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THE NAUTICAL ALMANAC

AND ASTRONOMICAL EPHEMERIS
FOR THE YEAR

1931

FOR THE MERIDIAN OF THE
ROYAL OBSERVATORY AT GREENWICH

(STANDARD EDITION)

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PREFACE.

The NAUTICAL ALMANAC for 1931 differs materially in arrangement from previous volumes. The principal changes are :—

- (1) All quantities that are tabulated at regular intervals of 24 hours are now given for midnight (0^h) instead of for noon (12^h) as formerly.
- (2) The month by month arrangement of the Sun and Moon ephemerides has been abandoned. The ephemeris of the Sun now occupies pages 6-54 and that of the Moon 55-179. The *Moon at Transit at Greenwich*, formerly given after the *Apparent Places of Stars*, is now given with the remainder of the lunar ephemeris, the defective illumination being given in the form of footnotes and not in the *Ephemeris for Physical Observations of the Moon*, with which it had no connection.
- (3) The designations N. and S. for north and south declination or latitude have been replaced by the signs + and —.
- (4) Whenever possible quantities that are likely to be required together are presented at one opening, e.g. in the ephemeris of the Sun, and in the *Independent Day Numbers*.
- (5) The modern tendency towards the use of calculating machines is facilitated by giving the natural as well as the logarithmic values of many quantities, e.g. the Sun's radius vector, and the *Besselian* and *Independent Day Numbers*. Also there is a tendency to express angles in degrees and decimals rather than in degrees, minutes and seconds.
- (6) The Sun's longitude, latitude and rectangular co-ordinates are now referred to the mean equinox of the beginning of the year, and not to the true equinox of date. The latter are given at intervals of 24^h instead of for every 12^h as formerly, but with first and second differences.
- (7) For the convenience of astronomers interested in orbits planetary ephemerides for the standard equinox of 1950.0 are provided. The Sun's longitude, latitude, radius vector and equatorial rectangular co-ordinates are given each year in the NAUTICAL ALMANAC, while the data for the planets will be issued in separate volumes covering twenty years each. The volume for 1920-39 is now in preparation.
- (8) The apparent obliquity, the short-period terms of nutation in longitude, and the long-period and short-period terms of nutation in obliquity are no longer tabulated, although provision is made for obtaining them.
- (9) To facilitate interpolation the variations per hour or per day of many of the quantities tabulated have been added. In the hourly ephemeris of the Moon's *Right Ascension and Declination* the *Variation per minute* is given instead of the *Variation per 10 minutes* as formerly.
- (10) Tables are provided for the calculation of the small corrections for differential precession, nutation and aberration required by micrometrical observations of comets and minor planets.

PREFACE.

- (11) Two new circumpolar stars (β and δ Octantis) have been added, and also 24 10-day stars as follows:—

α Trianguli	ν Argus	γ Apodis	ζ Pavonis
ρ Persei	ν Ursæ Majoris	20 Ophiuchi	ϵ Draconis
λ Tauri	κ Draconis	μ^1 Scorpii	ϵ Pavonis
α (9) Camelopardalis	δ Muscæ	η Scorpii	η Cephei
ι Tauri	α Apodis	G Scorpii	ι Cephei
θ Puppis	δ Lupi	χ Draconis	72 Pegasi

The date on which two transits of each 10-day star occur is now given.

- (12) The eclipse maps have been reproduced on a smaller scale in order to avoid a folded page.
- (13) Predictions of occultations are given for the Royal Observatories at Edinburgh and Cape of Good Hope, in addition to those for Greenwich.
- (14) The *Ephemeris for Physical Observations of the Sun* is now given for every day, instead of for every 5th day as formerly.
- (15) The position angle of the terminator of the Moon and the fraction illuminated have been added.
- (16) The ephemeris for physical observations and satellite data for each planet have been brought together.
- (17) The time of transit of the zero meridian of Jupiter has been replaced by the longitude of the central meridian (corrected for phase) at 0^h.
- (18) Additional information concerning the satellites of Jupiter and Saturn is given.
- (19) The list of *Standard Times* has been supplemented by a list in alphabetical geographical order, showing the times adopted in each country.
- (20) The collection of *Tables* has been considerably augmented.
- (21) The *Explanation* has been re-written in an expanded and more detailed form. A section giving the *Derivation* of most of the quantities in the ALMANAC has been added.
- (22) An *Index to the Places of Stars* and a *General Index* has been included.

Considerable attention has been paid to typographical details in an effort to produce a standard for the printing of tabular matter. The printers, Messrs. James Truscott and Son, Ltd., have co-operated very helpfully in this matter, whilst the technical officers at H.M. Stationery Office have also rendered valuable assistance.

By international arrangement certain portions of the NAUTICAL ALMANAC are supplied from the offices of the *American Ephemeris*, the *Connaissance des Temps*, the *Berliner Jahrbuch*, and the *Almanaque Nautico*. These are as follows:—

From Washington.—Apparent places of stars marked A.E. at the foot of the column; eclipses; elements of occultations; Jupiter's Vth, VIth and VIIth satellites; Saturn's satellites and rings (except differential co-ordinates of Hyperion and Japetus); satellites of Uranus and Neptune; physical ephemerides of Sun, Moon (except position angle of terminator and fraction illuminated), Mercury, Venus, Mars and Jupiter; sunrise, sunset, moonrise and moonset.

From Paris.—Apparent places of circumpolar stars; eclipses; Jupiter's four great satellites.

From Berlin.—Apparent places of stars marked B.J. at the foot of the column; differential co-ordinates of Hyperion and Japetus.

From San Fernando.—Apparent places of stars marked A.N. at the foot of the column.

PREFACE.

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Mr. W. F. Doak retired on 1929 May 20 on reaching the age limit. The staff at present consists of :—

Deputy Superintendent.—L. J. Comrie, M.A., Ph.D., F.R.A.S.

Assistants.—(1) Vacant

(2) Vacant

Computers.—S. G. Daniels

W. A. Scott

A. J. Daniels

J. R. Bennett

Secretary.— Mrs. W. Rayson

Temporary Machine Operators.—

J. R. Dagger

Miss G. M. Greenwood

Mrs. N. Frayne

Miss K. C. Brown

Miss M. E. Williams

In addition a number of piece-workers are employed, chief of whom are J. H. Bell, A. C. D. Crommelin, T. C. Hudson, G. C. W. Nyberg, S. C. Robinson and J. A. Sprigge.

The article on *The Calendar* (pages 734-747) was written by Dr. J. K. Fotheringham, Reader in Ancient Astronomy and Chronology in the University of Oxford.

To the Deputy Superintendent, Dr. L. J. Comrie, properly belongs the credit of the present enlargement and re-arrangement of the NAUTICAL ALMANAC. It is also owing to his special knowledge of calculating machines that the Office is now well equipped in that respect.

P. H. COWELL

Superintendent.

H.M. Nautical Almanac Office

Royal Naval College

Greenwich

London, S.E.10.

1929 June.

ERRATA.

(Continued from page ix of the NAUTICAL ALMANAC for 1930)

Nautical Almanac for the Year 1916

Page 52A. Log of radius vector of Venus 1932 September 12
For 9.959 5284 read 9.859 5284

Nautical Almanac for the Year 1917

Page 52A. Latitude of Mars 1932 November 19
For 47".56 read 47".46

Nautical Almanac for the Year 1928

Page 505. October 1
For 33 Arietis read 31 Arietis

Nautical Almanac for the Year 1929

Page 496. January 6, 11 H. Libræ

For	^h 13	^m 49	^h 06	^m 47	[°] 174	[°] 190
Read	14	05	07	03	195	209

Nautical Almanac for the Year 1931

Page 54. Precession Constants
For *Z* read *z*

Page 55. Column 4
For Ω read Ω'

CALENDAR, 1931.

I

Golden Number	..	..	XIII	Solar Cycle	..	..	8
Epact	..	..	..	Roman Indiction	..	..	14
Dominical Letter	..	..	D	Julian Period (year of)	..	6644	

FIXED AND MOVABLE FESTIVALS, ANNIVERSARIES, ETC., ETC.

Epiphany	..	..	Jan.	6	<i>Feast of Weeks (Jewish)</i>	..	May	22
<i>Ramadân (Moslem), First Day</i>					<i>Whit Sunday</i>	..	..	24
<i>of</i>	..	..	..	20	Empire (Victoria) Day	..	..	24
<i>Septuagesima Sunday</i>	..	Feb.	1		Birthday of Queen Mary	..	..	26
<i>Quinquagesima (Shrove) Sun-</i>					<i>Trinity Sunday</i>	..	..	31
<i>day</i>	..	..	..	15				
<i>Ash Wednesday</i>	..	..	..	18				
					Union Day (South Africa)	..	May	31
<i>Quadragesima Sunday (1st in</i>					Birthday of King George V	..	June	3
<i>Lent)</i>	..	..	Feb.	22	<i>Corpus Christi</i>	..	..	4
St. David	..	..	Mar.	1	Birthday of the Prince of			
St. Patrick	..	..	..	17	Wales	..	..	23
Annunciation—Lady Day	..	..	..	25	St. John Bapt.—Midsummer			
<i>Palm Sunday</i>	..	..	..	29	Day	..	..	24
<i>Passover, First Day of</i>	..	April	2		Dominion Day (Canada)	..	July	1
<i>Good Friday</i>	..	..	..	3	<i>Jewish New Year (5692)</i>	..	Sept.	12
<i>Easter Day</i>	..	..	..	5	<i>Day of Atonement (Jewish)</i>	..	..	21
<i>Low Sunday</i>	..	..	..	12	<i>Tabernacles (Jewish)</i>	..	..	26
St. George	..	..	..	23	St. Michael—Michaelmas Day	..	..	29
Anzac Day	..	..	April	25	Armistice Day	..	..	Nov. 11
Accession of King George V	..	May	6		<i>1st Sunday in Advent</i>	..	..	29
<i>Rogation Sunday</i>	..	..	..	10	St. Andrew	..	..	30
<i>Ascension Day—Holy Thurs-</i>					St. Thomas	..	..	Dec. 21
<i>day</i>	..	..	..	14	Christmas Day (<i>Friday</i>)	..	..	25
<i>Mohammedan New Year (1350)</i>	..	..	..	19				

CALENDAR, 1931.

Day of Month.	JANUARY.				FEBRUARY.				MARCH.			
	Day of Week.	Day of Year.	Fraction of Year.	Julian Date.	Day of Week.	Day of Year.	Fraction of Year.	Julian Date.	Day of Week.	Day of Year.	Fraction of Year.	Julian Date.
				2426				2426				2426
1·0	Th.	0	·000	342·5	§.	31	·085	373·5	§.	59	·162	401·5
2·0	F.	1	·003	343·5	M.	32	·088	374·5	M.	60	·164	402·5
3·0	S.	2	·005	344·5	Tu.	33	·090	375·5	Tu.	61	·167	403·5
4·0	§.	3	·008	345·5	W.	34	·093	376·5	W.	62	·170	404·5
5·0	M.	4	·011	346·5	Th.	35	·096	377·5	Th.	63	·172	405·5
6·0	Tu.	5	·014	347·5	F.	36	·099	378·5	F.	64	·175	406·5
7·0	W.	6	·016	348·5	S.	37	·101	379·5	S.	65	·178	407·5
8·0	Th.	7	·019	349·5	§.	38	·104	380·5	§.	66	·181	408·5
9·0	F.	8	·022	350·5	M.	39	·107	381·5	M.	67	·183	409·5
10·0	S.	9	·025	351·5	Tu.	40	·110	382·5	Tu.	68	·186	410·5
11·0	§.	10	·027	352·5	W.	41	·112	383·5	W.	69	·189	411·5
12·0	M.	11	·030	353·5	Th.	42	·115	384·5	Th.	70	·192	412·5
13·0	Tu.	12	·033	354·5	F.	43	·118	385·5	F.	71	·194	413·5
14·0	W.	13	·036	355·5	S.	44	·120	386·5	S.	72	·197	414·5
15·0	Th.	14	·038	356·5	§.	45	·123	387·5	§.	73	·200	415·5
16·0	F.	15	·041	357·5	M.	46	·126	388·5	M.	74	·203	416·5
17·0	S.	16	·044	358·5	Tu.	47	·129	389·5	Tu.	75	·205	417·5
18·0	§.	17	·047	359·5	W.	48	·131	390·5	W.	76	·208	418·5
19·0	M.	18	·049	360·5	Th.	49	·134	391·5	Th.	77	·211	419·5
20·0	Tu.	19	·052	361·5	F.	50	·137	392·5	F.	78	·214	420·5
21·0	W.	20	·055	362·5	S.	51	·140	393·5	S.	79	·216	421·5
22·0	Th.	21	·057	363·5	§.	52	·142	394·5	§.	80	·219	422·5
23·0	F.	22	·060	364·5	M.	53	·145	395·5	M.	81	·222	423·5
24·0	S.	23	·063	365·5	Tu.	54	·148	396·5	Tu.	82	·225	424·5
25·0	§.	24	·066	366·5	W.	55	·151	397·5	W.	83	·227	425·5
26·0	M.	25	·068	367·5	Th.	56	·153	398·5	Th.	84	·230	426·5
27·0	Tu.	26	·071	368·5	F.	57	·156	399·5	F.	85	·233	427·5
28·0	W.	27	·074	369·5	S.	58	·159	400·5	S.	86	·235	428·5
29·0	Th.	28	·077	370·5					§.	87	·238	429·5
30·0	F.	29	·079	371·5					M.	88	·241	430·5
31·0	S.	30	·082	372·5					Tu.	89	·244	431·5

The Day of the Year and the Fraction of the Year are reckoned from January 1st 0^h, and the latter is based on the tropical year of 365·2422 days. To obtain the Fraction of the Year from the commencement of the Besselian fictitious year (1931·0 or 1931 Jan. 1st 322), or the time when the Sun's mean longitude, affected by aberration, is 280°, the above fractions must be diminished by ·001.

The Julian Day commences at noon.

CALENDAR, 1931.

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Day of Month.	APRIL.				MAY.				JUNE.			
	Day of Week.	Day of Year.	Fraction of Year.	Julian Date.	Day of Week.	Day of Year.	Fraction of Year.	Julian Date.	Day of Week.	Day of Year.	Fraction of Year.	Julian Date.
1 ^o	W.	90	.246	2426	F.	120	.329	2426	M.	151	.413	2426
2 ^o	Th.	91	.249	432.5	S.	121	.331	462.5	Tu.	152	.416	493.5
3 ^o	F.	92	.252	433.5	S.	122	.334	463.5	W.	153	.419	494.5
4 ^o	S.	93	.255	434.5	M.	123	.337	464.5	Th.	154	.422	495.5
5 ^o	S.	94	.257	435.5	Tu.	124	.340	465.5	F.	155	.424	496.5
6 ^o	M.	95	.260	436.5	W.	125	.342	466.5	S.	156	.427	497.5
7 ^o	Tu.	96	.263	437.5	Th.	126	.345	467.5	S.	157	.430	498.5
8 ^o	W.	97	.266	438.5	F.	127	.348	468.5	M.	158	.433	499.5
9 ^o	Th.	98	.268	439.5	S.	128	.350	469.5	Tu.	159	.435	500.5
10 ^o	F.	99	.271	440.5	S.	129	.353	470.5	W.	160	.438	501.5
11 ^o	S.	100	.274	441.5	S.	129	.353	471.5	W.	160	.438	502.5
12 ^o	S.	100	.274	442.5	M.	130	.356	472.5	Th.	161	.441	503.5
13 ^o	S.	101	.277	443.5	Tu.	131	.359	473.5	F.	162	.444	504.5
14 ^o	M.	102	.279	444.5	W.	132	.361	474.5	S.	163	.446	505.5
15 ^o	Tu.	103	.282	445.5	Th.	133	.364	475.5	S.	164	.449	506.5
16 ^o	W.	104	.285	446.5	F.	134	.367	476.5	M.	165	.452	507.5
17 ^o	Th.	105	.287	447.5	S.	135	.370	477.5	Tu.	166	.454	508.5
18 ^o	F.	106	.290	448.5	S.	136	.372	478.5	W.	167	.457	509.5
19 ^o	S.	107	.293	449.5	M.	137	.375	479.5	Th.	168	.460	510.5
20 ^o	S.	108	.296	450.5	Tu.	138	.378	480.5	F.	169	.463	511.5
21 ^o	M.	109	.298	451.5	W.	139	.381	481.5	S.	170	.465	512.5
22 ^o	Tu.	110	.301	452.5	Th.	140	.383	482.5	S.	171	.468	513.5
23 ^o	W.	111	.304	453.5	F.	141	.386	483.5	M.	172	.471	514.5
24 ^o	Th.	112	.307	454.5	S.	142	.389	484.5	Tu.	173	.474	515.5
25 ^o	F.	113	.309	455.5	S.	143	.392	485.5	W.	174	.476	516.5
26 ^o	S.	114	.312	456.5	M.	144	.394	486.5	Th.	175	.479	517.5
27 ^o	S.	115	.315	457.5	Tu.	145	.397	487.5	F.	176	.482	518.5
28 ^o	M.	116	.318	458.5	W.	146	.400	488.5	S.	177	.485	519.5
29 ^o	Tu.	117	.320	459.5	Th.	147	.402	489.5	S.	178	.487	520.5
30 ^o	W.	118	.323	460.5	F.	148	.405	490.5	M.	179	.490	521.5
31 ^o	Th.	119	.326	461.5	S.	149	.408	491.5	Tu.	180	.493	522.5
31 ^o					S.	150	.411	492.5				

The Day of the Year and the Fraction of the Year are reckoned from January 1st 0^h, and the latter is based on the tropical year of 365.2422 days. To obtain the Fraction of the Year from the commencement of the Besselian fictitious year (1931.0 or 1931 Jan. 1st 322), or the time when the Sun's mean longitude, affected by aberration, is 280°, the above fractions must be diminished by .001.

The Julian Day commences at noon.

CALENDAR, 1931.

Day of Month.	JULY.				AUGUST.				SEPTEMBER.			
	Day of Week.	Day of Year.	Fraction of Year.	Julian Date.	Day of Week.	Day of Year.	Fraction of Year.	Julian Date.	Day of Week.	Day of Year.	Fraction of Year.	Julian Date.
				2426				2426				2426
1 ^o	W.	181	.496	523.5	S.	212	.580	554.5	Tu.	243	.665	585.5
2 ^o	Th.	182	.498	524.5	S.	213	.583	555.5	W.	244	.668	586.5
3 ^o	F.	183	.501	525.5	M.	214	.586	556.5	Th.	245	.671	587.5
4 ^o	S.	184	.504	526.5	Tu.	215	.589	557.5	F.	246	.674	588.5
5 ^o	S.	185	.507	527.5	W.	216	.591	558.5	S.	247	.676	589.5
6 ^o	M.	186	.509	528.5	Th.	217	.594	559.5	S.	248	.679	590.5
7 ^o	Tu.	187	.512	529.5	F.	218	.597	560.5	M.	249	.682	591.5
8 ^o	W.	188	.515	530.5	S.	219	.600	561.5	Tu.	250	.684	592.5
9 ^o	Th.	189	.517	531.5	S.	220	.602	562.5	W.	251	.687	593.5
10 ^o	F.	190	.520	532.5	M.	221	.605	563.5	Th.	252	.690	594.5
11 ^o	S.	191	.523	533.5	Tu.	222	.608	564.5	F.	253	.693	595.5
12 ^o	S.	192	.526	534.5	W.	223	.611	565.5	S.	254	.695	596.5
13 ^o	M.	193	.528	535.5	Th.	224	.613	566.5	S.	255	.698	597.5
14 ^o	Tu.	194	.531	536.5	F.	225	.616	567.5	M.	256	.701	598.5
15 ^o	W.	195	.534	537.5	S.	226	.619	568.5	Tu.	257	.704	599.5
16 ^o	Th.	196	.537	538.5	S.	227	.622	569.5	W.	258	.706	600.5
17 ^o	F.	197	.539	539.5	M.	228	.624	570.5	Th.	259	.709	601.5
18 ^o	S.	198	.542	540.5	Tu.	229	.627	571.5	F.	260	.712	602.5
19 ^o	S.	199	.545	541.5	W.	230	.630	572.5	S.	261	.715	603.5
20 ^o	M.	200	.548	542.5	Th.	231	.632	573.5	S.	262	.717	604.5
21 ^o	Tu.	201	.550	543.5	F.	232	.635	574.5	M.	263	.720	605.5
22 ^o	W.	202	.553	544.5	S.	233	.638	575.5	Tu.	264	.723	606.5
23 ^o	Th.	203	.556	545.5	S.	234	.641	576.5	W.	265	.726	607.5
24 ^o	F.	204	.559	546.5	M.	235	.643	577.5	Th.	266	.728	608.5
25 ^o	S.	205	.561	547.5	Tu.	236	.646	578.5	F.	267	.731	609.5
26 ^o	S.	206	.564	548.5	W.	237	.649	579.5	S.	268	.734	610.5
27 ^o	M.	207	.567	549.5	Th.	238	.652	580.5	S.	269	.736	611.5
28 ^o	Tu.	208	.569	550.5	F.	239	.654	581.5	M.	270	.739	612.5
29 ^o	W.	209	.572	551.5	S.	240	.657	582.5	Tu.	271	.742	613.5
30 ^o	Th.	210	.575	552.5	S.	241	.660	583.5	W.	272	.745	614.5
31 ^o	F.	211	.578	553.5	M.	242	.663	584.5				

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The Julian Day commences at noon.

Day of Month.	OCTOBER.				NOVEMBER.				DECEMBER.			
	Day of Week.	Day of Year.	Fraction of Year.	Julian Date.	Day of Week.	Day of Year.	Fraction of Year.	Julian Date.	Day of Week.	Day of Year.	Fraction of Year.	Julian Date.
1 ^o	Th.	273	.747	2426 615.5	S.	304	.832	2426 646.5	Tu.	334	.914	2426 676.5
2 ^o	F.	274	.750	616.5	M.	305	.835	647.5	W.	335	.917	677.5
3 ^o	S.	275	.753	617.5	Tu.	306	.838	648.5	Th.	336	.920	678.5
4 ^o	S.	276	.756	618.5	W.	307	.841	649.5	F.	337	.923	679.5
5 ^o	M.	277	.758	619.5	Th.	308	.843	650.5	S.	338	.925	680.5
6 ^o	Tu.	278	.761	620.5	F.	309	.846	651.5	S.	339	.928	681.5
7 ^o	W.	279	.764	621.5	S.	310	.849	652.5	M.	340	.931	682.5
8 ^o	Th.	280	.767	622.5	S.	311	.851	653.5	Tu.	341	.934	683.5
9 ^o	F.	281	.769	623.5	M.	312	.854	654.5	W.	342	.936	684.5
10 ^o	S.	282	.772	624.5	Tu.	313	.857	655.5	Th.	343	.939	685.5
11 ^o	S.	283	.775	625.5	W.	314	.860	656.5	F.	344	.942	686.5
12 ^o	M.	284	.778	626.5	Th.	315	.862	657.5	S.	345	.945	687.5
13 ^o	Tu.	285	.780	627.5	F.	316	.865	658.5	S.	346	.947	688.5
14 ^o	W.	286	.783	628.5	S.	317	.868	659.5	M.	347	.950	689.5
15 ^o	Th.	287	.786	629.5	S.	318	.871	660.5	Tu.	348	.953	690.5
16 ^o	F.	288	.789	630.5	M.	319	.873	661.5	W.	349	.956	691.5
17 ^o	S.	289	.791	631.5	Tu.	320	.876	662.5	Th.	350	.958	692.5
18 ^o	S.	290	.794	632.5	W.	321	.879	663.5	F.	351	.961	693.5
19 ^o	M.	291	.797	633.5	Th.	322	.882	664.5	S.	352	.964	694.5
20 ^o	Tu.	292	.799	634.5	F.	323	.884	665.5	S.	353	.966	695.5
21 ^o	W.	293	.802	635.5	S.	324	.887	666.5	M.	354	.969	696.5
22 ^o	Th.	294	.805	636.5	S.	325	.890	667.5	Tu.	355	.972	697.5
23 ^o	F.	295	.808	637.5	M.	326	.893	668.5	W.	356	.975	698.5
24 ^o	S.	296	.810	638.5	Tu.	327	.895	669.5	Th.	357	.977	699.5
25 ^o	S.	297	.813	639.5	W.	328	.898	670.5	F.	358	.980	700.5
26 ^o	M.	298	.816	640.5	Th.	329	.901	671.5	S.	359	.983	701.5
27 ^o	Tu.	299	.819	641.5	F.	330	.904	672.5	S.	360	.986	702.5
28 ^o	W.	300	.821	642.5	S.	331	.906	673.5	M.	361	.988	703.5
29 ^o	Th.	301	.824	643.5	S.	332	.909	674.5	Tu.	362	.991	704.5
30 ^o	F.	302	.827	644.5	M.	333	.912	675.5	W.	363	.994	705.5
31 ^o	S.	303	.830	645.5					Th.	364	.997	706.5

The Day of the Year and the Fraction of the Year are reckoned from January 1st 0h, and the latter is based on the tropical year of 365.2422 days. To obtain the Fraction of the Year from the commencement of the Besselian fictitious year (1931.0 or 1931 Jan. 1st 322), or the time when the Sun's mean longitude, affected by aberration, is 280°, the above fractions must be diminished by .001.

The Julian Day commences at noon.

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Semi- diameter.	Equation of Time. App.-Mean	Var. per Hour.	Sidereal Time.
Jan.	^h ^m ^s	^s	[°] ['] ["]	["]	['] ["]	^m ^s	^s	^h ^m ^s
1	18 41 49.81	11.050	-23 06 07.2	+11.04	16 17.54	- 3 06.22	-1.193	06 38 43.59
2	18 46 14.85	11.037	23 01 28.3	12.19	16 17.55	3 34.70	1.180	06 42 40.15
3	18 50 39.57	11.023	22 56 21.9	13.34	16 17.56	4 02.86	1.166	06 46 36.71
4	18 55 03.93	11.007	22 50 48.1	14.47	16 17.56	4 30.66	1.151	06 50 33.27
5	18 59 27.91	10.991	22 44 47.1	15.60	16 17.55	4 58.08	1.134	06 54 29.83
6	19 03 51.48	10.974	-22 38 19.1	+16.73	16 17.54	- 5 25.10	-1.117	06 58 26.39
7	19 08 14.63	10.955	22 31 24.3	17.84	16 17.52	5 51.69	1.099	07 02 22.95
8	19 12 37.33	10.936	22 24 02.8	18.95	16 17.49	6 17.83	1.080	07 06 19.51
9	19 16 59.56	10.916	22 16 14.8	20.05	16 17.46	6 43.49	1.059	07 10 16.07
10	19 21 21.29	10.895	22 08 00.6	21.14	16 17.42	7 08.66	1.038	07 14 12.62
11	19 25 42.50	10.873	-21 59 20.3	+22.22	16 17.38	- 7 33.32	-1.016	07 18 09.18
12	19 30 03.17	10.849	21 50 14.3	23.28	16 17.33	7 57.43	0.993	07 22 05.74
13	19 34 23.27	10.825	21 40 42.8	24.34	16 17.28	8 20.97	0.969	07 26 02.30
14	19 38 42.77	10.800	21 30 45.9	25.39	16 17.22	8 43.92	0.944	07 29 58.86
15	19 43 01.67	10.774	21 20 24.1	26.43	16 17.16	9 06.25	0.917	07 33 55.42
16	19 47 19.92	10.747	-21 09 37.6	+27.45	16 17.09	- 9 27.94	-0.890	07 37 51.97
17	19 51 37.51	10.719	20 58 26.7	28.46	16 17.02	9 48.98	0.862	07 41 48.53
18	19 55 54.42	10.690	20 46 51.7	29.45	16 16.95	10 09.32	0.833	07 45 45.09
19	20 00 10.62	10.660	20 34 53.0	30.44	16 16.87	10 28.97	0.804	07 49 41.65
20	20 04 26.10	10.630	20 22 30.8	31.41	16 16.79	10 47.89	0.773	07 53 38.21
21	20 08 40.84	10.598	-20 09 45.6	+32.36	16 16.70	-11 06.07	-0.742	07 57 34.76
22	20 12 54.82	10.567	19 56 37.8	33.30	16 16.61	11 23.50	0.710	08 01 31.32
23	20 17 08.03	10.534	19 43 07.6	34.22	16 16.52	11 40.15	0.677	08 05 27.88
24	20 21 20.45	10.501	19 29 15.4	35.12	16 16.42	11 56.01	0.644	08 09 24.44
25	20 25 32.07	10.468	19 15 01.7	36.02	16 16.32	12 11.08	0.611	08 13 20.99
26	20 29 42.89	10.434	-19 00 26.8	+36.89	16 16.22	-12 25.33	-0.577	08 17 17.55
27	20 33 52.89	10.400	18 45 31.1	37.75	16 16.11	12 38.78	0.543	08 21 14.11
28	20 38 02.06	10.365	18 30 15.1	38.59	16 16.00	12 51.40	0.509	08 25 10.67
29	20 42 10.41	10.330	18 14 39.0	39.41	16 15.88	13 03.19	0.474	08 29 07.22
30	20 46 17.92	10.296	17 58 43.3	40.22	16 15.76	13 14.14	0.439	08 33 03.78
31	20 50 24.60	10.261	-17 42 28.4	+41.01	16 15.63	-13 24.27	-0.404	08 37 00.34
Feb.	^h ^m ^s	^s	[°] ['] ["]	["]	['] ["]	^m ^s	^s	^h ^m ^s
1	20 54 30.45	10.226	17 25 54.8	41.79	16 15.49	13 33.56	0.370	08 40 56.89
2	20 58 35.47	10.192	17 09 02.7	42.55	16 15.35	13 42.02	0.335	08 44 53.45
3	21 02 39.67	10.158	16 51 52.5	43.29	16 15.21	13 49.66	0.301	08 48 50.01
4	21 06 43.04	10.124	16 34 24.7	44.02	16 15.06	13 56.48	0.267	08 52 46.56
5	21 10 45.61	10.090	-16 16 39.6	+44.73	16 14.90	-14 02.49	-0.234	08 56 43.12
6	21 14 47.37	10.057	15 58 37.7	45.43	16 14.74	14 07.69	0.200	09 00 39.68
7	21 18 48.33	10.024	15 40 19.2	46.11	16 14.57	14 12.10	0.167	09 04 36.23
8	21 22 48.51	9.991	15 21 44.6	46.77	16 14.39	14 15.72	0.135	09 08 32.79
9	21 26 47.91	9.959	15 02 54.3	47.42	16 14.22	14 18.56	0.102	09 12 29.35
10	21 30 46.53	9.927	-14 43 48.7	+48.05	16 14.04	-14 20.63	-0.070	09 16 25.90
11	21 34 44.39	9.895	14 24 28.1	48.66	16 13.85	14 21.93	0.038	09 20 22.46
12	21 38 41.48	9.863	14 04 53.0	49.26	16 13.66	14 22.47	-0.007	09 24 19.01
13	21 42 37.82	9.832	13 45 03.9	49.84	16 13.47	14 22.25	+0.025	09 28 15.57
14	21 46 33.41	9.801	13 25 01.0	50.40	16 13.27	14 21.29	0.056	09 32 12.12
15	21 50 28.26	9.770	-13 04 45.0	+50.94	16 13.08	-14 19.58	+0.086	09 36 08.68
16	21 54 22.38	9.740	-12 44 16.2	+51.46	16 12.88	-14 17.14	+0.117	09 40 05.23

Date.	Mean Equinox of 1931.0.		Logarithm of Radius Vector of the Earth.	Prec. in Long.	Nut. in Long.	Nut. in R.A.	Transit of First Point of Aries.	
	Longitude.	Latitude.						
Jan.	1	279° 37' 04".4 3668.2	+0.54	9.992 6686	- 0.04	-5.23	-0.338	17 18 25.82
	2	280° 38' 12.6 3668.2	0.63	9.992 6631 - 55	+ 0.09	5.17	.331	17 14 29.90
	3	281° 39' 20.8 3668.1	0.71	9.992 6604 - 27	0.23	5.11	.321	17 10 33.99
	4	282° 40' 28.9 3668.0	0.76	9.992 6606 + 2	0.37	5.05	.309	17 06 38.08
	5	283° 41' 36.9 3667.9	0.79	9.992 6637 31	0.51	5.00	.298	17 02 42.16
	6	284° 42' 44.8 3668.0	+0.78	9.992 6697 60	+ 0.64	-4.94	-0.289	16 58 46.25
	7	285° 43' 52.8 3668.0	0.73	9.992 6786 + 89	0.78	4.88	.283	16 54 50.34
	8	286° 45' 00.8 3668.0	0.66	9.992 6904 118	0.92	4.83	.281	16 50 54.43
	9	287° 46' 08.8 3668.0	0.57	9.992 7049 145	1.06	4.77	.282	16 46 58.51
	10	288° 47' 16.9 3668.1	0.45	9.992 7219 170	1.19	4.72	.285	16 43 02.60
	11	289° 48' 25.1 3668.2	+0.32	9.992 7414 195	+ 1.33	-4.67	-0.289	16 39 06.69
	12	290° 49' 33.3 3668.2	0.19	9.992 7632 + 218	1.47	4.62	.291	16 35 10.77
	13	291° 50' 41.4 3668.1	+0.06	9.992 7871 239	1.61	4.57	.290	16 31 14.86
	14	292° 51' 49.5 3667.9	-0.04	9.992 8130 259	1.74	4.52	.286	16 27 18.95
	15	293° 52' 57.4 3667.6	0.13	9.992 8408 278	1.88	4.47	.279	16 23 23.04
	16	294° 54' 05.0 3667.3	-0.20	9.992 8703 295	+ 2.02	-4.42	-0.271	16 19 27.13
	17	295° 55' 12.3 3666.8	0.25	9.992 9015 + 312	2.16	4.38	.263	16 15 31.21
	18	296° 56' 19.1 3666.4	0.26	9.992 9344 329	2.30	4.33	.255	16 11 35.30
	19	297° 57' 25.5 3665.7	0.25	9.992 9689 345	2.43	4.29	.248	16 07 39.39
	20	298° 58' 31.2 3665.0	0.21	9.993 0051 362	2.57	4.25	.245	16 03 43.48
	21	299° 59' 36.2 3664.3	-0.14	9.993 0428 377	+ 2.71	-4.21	-0.244	15 59 47.57
	22	301° 00' 40.5 3663.4	-0.05	9.993 0822 + 394	2.85	4.17	.245	15 55 51.65
	23	302° 01' 43.9 3662.5	+0.05	9.993 1233 411	2.98	4.13	.248	15 51 55.74
	24	303° 02' 46.4 3661.4	0.17	9.993 1661 428	3.12	4.10	.253	15 47 59.83
	25	304° 03' 47.8 3660.5	0.29	9.993 2108 447	3.26	4.06	.257	15 44 03.92
	26	305° 04' 48.3 3659.3	+0.42	9.993 2573 465	+ 3.40	-4.03	-0.261	15 40 08.01
	27	306° 05' 47.6 3658.1	0.54	9.993 3058 + 485	3.53	4.00	.263	15 36 12.10
	28	307° 06' 45.7 3656.9	0.65	9.993 3563 505	3.67	3.97	.262	15 32 16.19
	29	308° 07' 42.6 3655.7	0.75	9.993 4089 526	3.81	3.94	.258	15 28 20.27
	30	309° 08' 38.3 3654.5	0.83	9.993 4638 549	3.95	3.91	.251	15 24 24.36
Feb.	31	310° 09' 32.8 3653.3	+0.88	9.993 5211 573	+ 4.08	-3.89	-0.242	15 20 28.45
	1	311° 10' 26.1 3652.0	0.90	9.993 5808 + 597	4.22	3.86	.233	15 16 32.54
	2	312° 11' 18.1 3650.9	0.89	9.993 6431 623	4.36	3.84	.225	15 12 36.63
	3	313° 12' 09.0 3649.8	0.84	9.993 7080 649	4.50	3.82	.220	15 08 40.72
	4	314° 12' 58.8 3648.7	0.77	9.993 7755 675	4.63	3.80	.218	15 04 44.81
	5	315° 13' 47.5 3647.7	+0.67	9.993 8456 701	+ 4.77	-3.78	-0.220	15 00 48.90
	6	316° 14' 35.2 3646.7	0.55	9.993 9181 + 725	4.91	3.77	.225	14 56 52.99
	7	317° 15' 21.9 3645.7	0.42	9.993 9930 749	5.05	3.76	.231	14 52 57.08
	8	318° 16' 07.6 3644.8	0.29	9.994 0701 771	5.19	3.74	.236	14 49 01.17
	9	319° 16' 52.4 3643.8	0.16	9.994 1492 791	5.32	3.73	.238	14 45 05.26
	10	320° 17' 36.2 3642.8	+0.04	9.994 2301 809	+ 5.46	-3.72	-0.238	14 41 09.35
	11	321° 18' 19.0 3641.7	-0.05	9.994 3128 + 827	5.60	3.72	.234	14 37 13.44
	12	322° 19' 00.7 3640.5	0.13	9.994 3970 842	5.74	3.71	.229	14 33 17.53
	13	323° 19' 41.2 3639.3	0.18	9.994 4826 856	5.87	3.71	.222	14 29 21.62
	14	324° 20' 20.5 3638.1	0.20	9.994 5695 869	6.01	3.70	.217	14 25 25.71
	15	325° 20' 58.6 3636.8	-0.19	9.994 6576 + 881	+ 6.15	-3.70	-0.213	14 21 29.80
16	326° 21' 35.4	-0.15	9.994 7468 + 892	+ 6.29	-3.70	-0.211	14 17 33.89	

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Semi- diameter.	Equation of Time. App.-Mean.	Var. per Hour.	Sidereal Time.
	h m s	s	° ' "	"	' "	m s	s	h m s
Feb. 16	21 54 22.38	9.740	-12 44 16.2	+51.46	16 12.88	-14 17.14	+0.117	09 40 05.23
17	21 58 15.77	9.710	12 23 35.0	51.97	16 12.67	14 13.98	0.147	09 44 01.79
18	22 02 08.45	9.680	12 02 41.8	52.46	16 12.47	14 10.11	0.176	09 47 58.34
19	22 06 00.42	9.651	11 41 37.2	52.93	16 12.26	14 05.52	0.205	09 51 54.90
20	22 09 51.70	9.622	11 20 21.5	53.38	16 12.05	14 00.25	0.234	09 55 51.45
21	22 13 42.29	9.594	-10 58 55.2	+53.81	16 11.84	-13 54.28	+0.263	09 59 48.01
22	22 17 32.22	9.566	10 37 18.7	54.23	16 11.63	13 47.65	0.290	10 03 44.56
23	22 21 21.48	9.539	10 15 32.5	54.62	16 11.42	13 40.36	0.317	10 07 41.12
24	22 25 10.10	9.512	9 53 36.9	55.00	16 11.20	13 32.42	0.344	10 11 37.67
25	22 28 58.08	9.486	9 31 32.5	55.37	16 10.98	13 23.85	0.370	10 15 34.23
26	22 32 45.45	9.461	-9 09 19.5	+55.71	16 10.76	-13 14.67	+0.395	10 19 30.78
27	22 36 32.22	9.436	8 46 58.5	56.04	16 10.53	13 04.88	0.420	10 23 27.34
28	22 40 18.41	9.412	8 24 29.8	56.35	16 10.30	12 54.51	0.444	10 27 23.89
Mar. 1	22 44 04.03	9.389	8 01 53.8	56.64	16 10.07	12 43.58	0.467	10 31 20.45
2	22 47 49.10	9.367	7 39 11.0	56.92	16 09.84	12 32.10	0.489	10 35 17.00
3	22 51 33.66	9.346	-7 16 21.7	+57.19	16 09.60	-12 20.10	+0.511	10 39 13.56
4	22 55 17.71	9.326	6 53 26.2	57.43	16 09.35	12 07.60	0.531	10 43 10.11
5	22 59 01.29	9.306	6 30 25.0	57.67	16 09.11	11 54.63	0.550	10 47 06.66
6	23 02 44.42	9.288	6 07 18.3	57.89	16 08.86	11 41.20	0.569	10 51 03.22
7	23 06 27.11	9.270	5 44 06.6	58.09	16 08.60	11 27.34	0.586	10 54 59.77
8	23 10 09.40	9.254	-5 20 50.1	+58.28	16 08.34	-11 13.08	+0.602	10 58 56.33
9	23 13 51.31	9.238	4 57 29.3	58.45	16 08.08	10 58.43	0.618	11 02 52.88
10	23 17 32.85	9.224	4 34 04.5	58.61	16 07.82	10 43.42	0.633	11 06 49.43
11	23 21 14.05	9.210	4 10 36.1	58.76	16 07.56	10 28.07	0.647	11 10 45.99
12	23 24 54.93	9.197	3 47 04.4	58.88	16 07.29	10 12.39	0.660	11 14 42.54
13	23 28 35.51	9.185	-3 23 29.8	+58.99	16 07.02	-9 56.42	+0.672	11 18 39.09
14	23 32 15.80	9.174	2 59 52.7	59.09	16 06.75	9 40.16	0.683	11 22 35.65
15	23 35 55.83	9.163	2 36 13.6	59.17	16 06.48	9 23.63	0.694	11 26 32.20
16	23 39 35.61	9.153	2 12 32.7	59.23	16 06.21	9 06.86	0.704	11 30 28.76
17	23 43 15.16	9.143	1 48 50.5	59.28	16 05.94	8 49.85	0.713	11 34 25.31
18	23 46 54.50	9.135	-1 25 07.3	+59.31	16 05.67	-8 32.64	+0.722	11 38 21.86
19	23 50 33.64	9.127	1 01 23.6	59.33	16 05.40	8 15.23	0.729	11 42 18.42
20	23 54 12.61	9.120	0 37 39.8	59.32	16 05.13	7 57.64	0.736	11 46 14.97
21	23 57 51.42	9.114	-0 13 56.2	59.31	16 04.86	7 39.90	0.742	11 50 11.52
22	00 01 30.09	9.109	+0 09 46.8	59.27	16 04.59	7 22.02	0.748	11 54 08.08
23	00 05 08.64	9.104	+0 33 28.7	+59.22	16 04.32	-7 04.01	+0.753	11 58 04.63
24	00 08 47.08	9.100	0 57 09.3	59.16	16 04.05	6 45.90	0.757	12 02 01.18
25	00 12 25.44	9.097	1 20 48.1	59.07	16 03.78	6 27.40	0.760	12 05 57.74
26	00 16 03.72	9.094	1 44 24.7	58.98	16 03.51	6 09.43	0.762	12 09 54.29
27	00 19 41.96	9.092	2 07 58.8	58.86	16 03.24	5 51.11	0.764	12 13 50.85
28	00 23 20.16	9.091	+2 31 30.1	+58.74	16 02.97	-5 32.76	+0.765	12 17 47.40
29	00 26 58.35	9.091	2 54 58.0	58.59	16 02.70	5 14.40	0.765	12 21 43.95
30	00 30 36.55	9.092	3 18 22.4	58.44	16 02.43	4 56.05	0.764	12 25 40.51
31	00 34 14.78	9.094	3 41 42.8	58.27	16 02.16	4 37.72	0.762	12 29 37.06
Apr. 1	00 37 53.07	9.097	4 04 59.0	58.08	16 01.88	4 19.45	0.760	12 33 33.61
2	00 41 31.43	9.100	+4 28 10.7	+57.89	16 01.61	-4 01.26	+0.756	12 37 30.17
3	00 45 09.89	9.105	+4 51 17.4	+57.68	16 01.33	-3 43.17	+0.751	12 41 26.72

Date.	Mean Equinox of 1931.0.		Logarithm of Radius Vector of the Earth.	Prec. in Long.	Nut. in Long.	Nut. in R.A.	Transit of First Point of Aries.
	Longitude.	Latitude.					
Feb. 16	326° 21' 35.4"	0° 15'	9.994 7468	+ 6.29	-3.70	-0.211	14 17 33.89
17	327 22 10.8	0.09	.994 8371 + 903	6.42	3.70	.212	14 13 37.98
18	328 22 44.6	-0.01	.994 9283 912	6.56	3.71	.215	14 09 42.07
19	329 23 16.9	+0.09	.995 0206 923	6.70	3.71	.221	14 05 46.16
20	330 23 47.5	0.21	.995 1137 931	6.84	3.72	.227	14 01 50.25
	3629.0		942				
21	331 24 16.5	+0.33	9.995 2079	+ 6.97	-3.72	-0.234	13 57 54.34
22	332 24 43.7	0.45	.995 3031 + 952	7.11	3.73	.241	13 53 58.44
23	333 25 09.1	0.58	.995 3993 962	7.25	3.74	.246	13 50 02.53
24	334 25 32.5	0.69	.995 4965 972	7.39	3.75	.249	13 46 06.62
25	335 25 54.1	0.79	.995 5949 984	7.52	3.77	.248	13 42 10.71
	3619.5		995				
26	336 26 13.6	+0.87	9.995 6944	+ 7.66	-3.78	-0.245	13 38 14.80
27	337 26 31.1	0.92	.995 7953 + 1009	7.80	3.80	.239	13 34 18.89
28	338 26 46.6	0.95	.995 8975 1022	7.94	3.81	.233	13 30 22.98
Mar. 1	339 27 00.1	0.94	.996 0013 1038	8.08	3.83	.227	13 26 27.07
2	340 27 11.6	0.89	.996 1067 1054	8.21	3.85	.223	13 22 31.17
	3609.5		1070				
3	341 27 21.1	+0.82	9.996 2137	+ 8.35	-3.86	-0.223	13 18 35.26
4	342 27 28.6	0.72	.996 3225 + 1088	8.49	3.88	.227	13 14 39.35
5	343 27 34.3	0.59	.996 4331 1106	8.63	3.91	.233	13 10 43.44
6	344 27 38.2	0.45	.996 5454 1123	8.76	3.93	.240	13 06 47.53
7	345 27 40.3	0.31	.996 6592 1138	8.90	3.95	.247	13 02 51.63
	3600.5		1154				
8	346 27 40.8	+0.17	9.996 7746	+ 9.04	-3.97	-0.253	12 58 55.72
9	347 27 39.6	+0.04	.996 8914 + 1168	9.18	4.00	.255	12 54 59.81
10	348 27 36.8	-0.07	.997 0093 1179	9.31	4.02	.254	12 51 03.90
11	349 27 32.4	0.15	.997 1281 1188	9.45	4.05	.250	12 47 07.99
12	350 27 26.3	0.21	.997 2478 1197	9.59	4.07	.246	12 43 12.09
	3592.3		1203				
13	351 27 18.6	-0.24	9.997 3681	+ 9.73	-4.10	-0.242	12 39 16.18
14	352 27 09.2	0.25	.997 4890 + 1209	9.86	4.12	.239	12 35 20.27
15	353 26 58.1	0.22	.997 6103 1213	10.00	4.15	.238	12 31 24.36
16	354 26 45.1	0.17	.997 7319 1216	10.14	4.18	.240	12 27 28.45
17	355 26 30.4	-0.08	.997 8536 1217	10.28	4.21	.244	12 23 32.55
	3583.3		1218				
18	356 26 13.7	+0.02	9.997 9754	+ 10.41	-4.23	-0.250	12 19 36.64
19	357 25 55.1	0.13	.998 0973 + 1219	10.55	4.26	.258	12 15 40.73
20	358 25 34.6	0.25	.998 2191 1218	10.69	4.29	.266	12 11 44.82
21	359 25 12.0	0.37	.998 3409 1217	10.83	4.32	.274	12 07 48.92
22	0 24 47.3	0.49	.998 4626 1216	10.97	4.35	.281	12 03 53.01
	3573.1						
23	1 24 20.4	+0.61	9.998 5842	+ 11.10	-4.38	-0.286	11 59 57.10
24	2 23 51.3	0.72	.998 7057 + 1215	11.24	4.40	.287	11 56 01.19
25	3 23 20.0	0.80	.998 8271 1214	11.38	4.43	.286	11 52 05.28
26	4 22 46.4	0.86	.998 9486 1215	11.52	4.46	.282	11 48 09.38
27	5 22 10.5	0.89	.999 0702 1216	11.65	4.49	.277	11 44 13.47
	3561.7		1217				
28	6 21 32.2	+0.89	9.999 1919	+ 11.79	-4.52	-0.272	11 40 17.56
29	7 20 51.6	0.85	.999 3139 + 1220	11.93	4.54	.268	11 36 21.65
30	8 20 08.6	0.78	.999 4363 1224	12.07	4.57	.267	11 32 25.75
31	9 19 23.3	0.68	.999 5592 1229	12.20	4.60	.270	11 28 29.84
Apr. 1	10 18 35.7	0.56	.999 6826 1234	12.34	4.62	.276	11 24 33.93
	3550.3		1241				
2	11 17 46.0	+0.43	9.999 8067	+ 12.48	-4.65	-0.283	11 20 38.02
3	12 16 54.2	+0.29	9.999 9315 + 1248	+ 12.62	-4.67	-0.291	11 16 42.11

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Semi- diameter.	Equation of Time. App.-Mean	Var. per Hour.	Sidereal Time.
Apr. 1	^h ^m ^s 00 37 53.07	^s 9.097	[°] ['] ["] + 4 04 59.0	["] +58.08	['] ["] 16 01.88	^m ^s - 4 19.45	^s +0.760	^h ^m ^s 12 33 33.61
2	00 41 31.43	9.100	4 28 10.7	57.89	16 01.61	4 01.26	0.756	12 37 30.17
3	00 45 09.89	9.105	4 51 17.4	57.68	16 01.33	3 43.17	0.751	12 41 26.72
4	00 48 48.47	9.111	5 14 19.0	57.45	16 01.05	3 25.20	0.746	12 45 23.28
5	00 52 27.21	9.117	5 37 15.1	57.22	16 00.78	3 07.38	0.739	12 49 19.83
6	00 56 06.11	9.125	+ 6 00 05.3	+56.97	16 00.50	- 2 49.73	+0.732	12 53 16.38
7	00 59 45.21	9.133	6 22 49.5	56.71	16 00.22	2 32.27	0.723	12 57 12.94
8	01 03 24.52	9.143	6 45 27.2	56.43	15 59.94	2 15.02	0.714	13 01 09.49
9	01 07 04.06	9.153	7 07 58.1	56.14	15 59.65	1 58.01	0.704	13 05 06.05
10	01 10 43.85	9.163	7 30 21.9	55.84	15 59.37	1 41.25	0.693	13 09 02.60
11	01 14 23.91	9.175	+ 7 52 38.3	+55.52	15 59.10	- 1 24.75	+0.681	13 12 59.15
12	01 18 04.25	9.187	8 14 46.8	55.19	15 58.82	1 08.54	0.669	13 16 55.71
13	01 21 44.89	9.200	8 36 47.1	54.84	15 58.54	0 52.63	0.657	13 20 52.26
14	01 25 25.85	9.213	8 58 39.0	54.48	15 58.27	0 37.03	0.643	13 24 48.82
15	01 29 07.13	9.227	9 20 21.9	54.10	15 57.99	0 21.76	0.629	13 28 45.37
16	01 32 48.76	9.242	+ 9 41 55.7	+53.71	15 57.72	- 0 06.84	+0.615	13 32 41.93
17	01 36 30.75	9.257	10 03 19.8	53.30	15 57.46	+ 0 07.73	0.600	13 36 38.48
18	01 40 13.10	9.273	10 24 34.0	52.88	15 57.19	0 21.93	0.584	13 40 35.04
19	01 43 55.84	9.289	10 45 37.9	52.44	15 56.93	0 35.75	0.568	13 44 31.59
20	01 47 38.97	9.305	11 06 31.1	51.99	15 56.67	0 49.18	0.551	13 48 28.15
21	01 51 22.50	9.322	+11 27 13.3	+51.52	15 56.41	+ 1 02.21	+0.534	13 52 24.70
22	01 55 06.44	9.340	11 47 44.2	51.04	15 56.15	1 14.82	0.517	13 56 21.25
23	01 58 50.80	9.357	12 08 03.3	50.55	15 55.90	1 27.01	0.499	14 00 17.81
24	02 02 35.60	9.376	12 28 10.3	50.04	15 55.65	1 38.77	0.481	14 04 14.37
25	02 06 20.83	9.394	12 48 04.9	49.51	15 55.40	1 50.09	0.462	14 08 10.92
26	02 10 06.52	9.413	+13 07 46.8	+48.97	15 55.16	+ 2 00.95	+0.443	14 12 07.48
27	02 13 52.68	9.433	13 27 15.6	48.42	15 54.91	2 11.35	0.424	14 16 04.03
28	02 17 39.30	9.453	13 46 31.0	47.86	15 54.67	2 21.28	0.404	14 20 00.59
29	02 21 26.41	9.473	14 05 32.8	47.28	15 54.43	2 30.73	0.383	14 23 57.14
30	02 25 14.02	9.494	14 24 20.5	46.69	15 54.19	2 39.68	0.362	14 27 53.70
May 1	02 29 02.14	9.516	+14 42 54.0	+46.09	15 53.95	+ 2 48.12	+0.341	14 31 50.25
2	02 32 50.78	9.538	15 01 12.9	45.48	15 53.71	2 56.03	0.319	14 35 46.81
3	02 36 39.95	9.560	15 19 17.0	44.86	15 53.47	3 03.41	0.296	14 39 43.36
4	02 40 29.67	9.583	15 37 05.9	44.22	15 53.24	3 10.25	0.273	14 43 39.92
5	02 44 19.94	9.607	15 54 39.5	43.57	15 53.00	3 16.53	0.250	14 47 36.48
6	02 48 10.79	9.630	+16 11 57.3	+42.91	15 52.77	+ 3 22.25	+0.226	14 51 33.03
7	02 52 02.20	9.654	16 28 59.1	42.24	15 52.53	3 27.39	0.202	14 55 29.59
8	02 55 54.20	9.679	16 45 44.6	41.55	15 52.30	3 31.95	0.178	14 59 26.15
9	02 59 46.78	9.703	17 02 13.5	40.85	15 52.08	3 35.92	0.153	15 03 22.70
10	03 03 39.95	9.728	17 18 25.4	40.14	15 51.85	3 39.31	0.129	15 07 19.26
11	03 07 33.70	9.752	+17 34 20.1	+39.42	15 51.63	+ 3 42.11	+0.104	15 11 15.82
12	03 11 28.05	9.777	17 49 57.3	38.68	15 51.41	3 44.32	0.080	15 15 12.37
13	03 15 22.99	9.801	18 05 16.6	37.93	15 51.19	3 45.94	0.055	15 19 08.93
14	03 19 18.52	9.826	18 20 17.8	37.17	15 50.98	3 46.96	0.031	15 23 05.49
15	03 23 14.63	9.850	18 35 00.5	36.39	15 50.78	3 47.41	+0.006	15 27 02.04
16	03 27 11.33	9.874	+18 49 24.5	+35.60	15 50.57	+ 3 47.27	-0.018	15 30 58.60
17	03 31 08.60	9.898	+19 03 29.4	+34.80	15 50.37	+ 3 46.55	-0.042	15 34 55.16

Date.	Mean Equinox of 1931.0.		Logarithm of Radius Vector of the Earth.	Prec. in Long.	Nut. in Long.	Nut. in R.A.	Transit of First Point of Aries.
	Longitude.	Latitude.					
Apr. 1	10 18 35.7 3550.3	+0.56	9.999 6826 +1241	+12.34	-4.62	-0.276	11 24 33.93
2	11 17 46.0 3548.2	0.43	.999 8067 1248	12.48	4.65	.283	11 20 38.02
3	12 16 54.2 3546.1	0.29	9.999 9315 1254	12.62	4.67	.291	11 16 42.11
4	13 16 00.3 3544.2	+0.14	0.000 0569 1260	12.75	4.70	.297	11 12 46.21
5	14 15 04.5 3542.3	0.00	.000 1829 1264	12.89	4.72	.300	11 08 50.30
6	15 14 06.8 3540.5	-0.12	0.000 3093 +1267	+13.03	-4.74	-0.300	11 04 54.39
7	16 13 07.3 3538.7	0.22	.000 4360 1269	13.17	4.76	.297	11 00 58.48
8	17 12 06.0 3536.9	0.29	.000 5629 1268	13.30	4.79	.292	10 57 02.57
9	18 11 02.9 3535.2	0.34	.000 6897 1267	13.44	4.81	.287	10 53 06.66
10	19 09 58.1 3533.5	0.35	.000 8164 1263	13.58	4.82	.283	10 49 10.76
11	20 08 51.6 3531.8	-0.34	0.000 9427 +1258	+13.72	-4.84	-0.280	10 45 14.85
12	21 07 43.4 3529.9	0.29	.001 0685 1252	13.85	4.86	.281	10 41 18.94
13	22 06 33.3 3528.2	0.22	.001 1937 1245	13.99	4.88	.283	10 37 23.03
14	23 05 21.5 3526.4	0.14	.001 3182 1236	14.13	4.89	.288	10 33 27.12
15	24 04 07.9 3524.5	-0.03	.001 4418 1228	14.27	4.91	.295	10 29 31.21
16	25 02 52.4 3522.7	+0.09	0.001 5646 +1217	+14.41	-4.92	-0.302	10 25 35.31
17	26 01 35.1 3520.8	0.22	.001 6863 1206	14.54	4.93	.309	10 21 39.40
18	27 00 15.9 3518.8	0.34	.001 8069 1195	14.68	4.94	.315	10 17 43.49
19	27 58 54.7 3516.9	0.45	.001 9264 1183	14.82	4.95	.319	10 13 47.58
20	28 57 31.6 3514.8	0.56	.002 0447 1171	14.96	4.96	.321	10 09 51.67
21	29 56 06.4 3512.8	+0.65	0.002 1618 +1159	+15.09	-4.97	-0.319	10 05 55.76
22	30 54 39.2 3510.7	0.72	.002 2777 1147	15.23	4.97	.315	10 01 59.85
23	31 53 09.9 3508.5	0.75	.002 3924 1137	15.37	4.98	.308	09 58 03.94
24	32 51 38.4 3506.4	0.76	.002 5061 1127	15.51	4.98	.301	09 54 08.03
25	33 50 04.8 3504.2	0.73	.002 6188 1118	15.64	4.99	.296	09 50 12.12
26	34 48 29.0 3502.0	+0.67	0.002 7306 +1110	+15.78	-4.99	-0.293	09 46 16.21
27	35 46 51.0 3499.9	0.58	.002 8416 1103	15.92	4.99	.293	09 42 20.30
28	36 45 10.9 3497.9	0.47	.002 9519 1098	16.06	4.98	.297	09 38 24.40
29	37 43 28.8 3495.8	0.34	.003 0617 1093	16.19	4.98	.303	09 34 28.49
30	38 41 44.6 3493.9	0.19	.003 1710 1088	16.33	4.98	.309	09 30 32.58
May 1	39 39 58.5 3492.0	+0.04	0.003 2798 +1085	+16.47	-4.97	-0.314	09 26 36.67
2	40 38 10.5 3490.2	-0.11	.003 3883 1082	16.61	4.96	.316	09 22 40.76
3	41 36 20.7 3488.6	0.24	.003 4965 1077	16.74	4.95	.315	09 18 44.85
4	42 34 29.3 3487.0	0.35	.003 6042 1072	16.88	4.94	.311	09 14 48.94
5	43 32 36.3 3485.5	0.42	.003 7114 1066	17.02	4.93	.304	09 10 53.03
6	44 30 41.8 3484.1	-0.47	0.003 8180 +1058	+17.16	-4.92	-0.296	09 06 57.12
7	45 28 45.9 3482.6	0.50	.003 9238 1049	17.30	4.91	.289	09 03 01.20
8	46 26 48.5 3481.3	0.49	.004 0287 1038	17.43	4.89	.284	08 59 05.29
9	47 24 49.8 3479.9	0.46	.004 1325 1027	17.57	4.87	.281	08 55 09.38
10	48 22 49.7 3478.6	0.40	.004 2352 1013	17.71	4.85	.281	08 51 13.47
11	49 20 48.3 3477.3	-0.32	0.004 3365 + 998	+17.85	-4.83	-0.283	08 47 17.56
12	50 18 45.6 3476.0	0.22	.004 4363 983	17.98	4.81	.287	08 43 21.65
13	51 16 41.6 3474.6	-0.10	.004 5346 967	18.12	4.79	.292	08 39 25.74
14	52 14 36.2 3473.3	+0.01	.004 6313 949	18.26	4.77	.297	08 35 29.83
15	53 12 29.5 3472.0	0.13	.004 7262 930	18.40	4.74	.301	08 31 33.92
16	54 10 21.5 3470.6	+0.25	0.004 8192 + 910	+18.53	-4.71	-0.304	08 27 38.01
17	55 08 12.1	+0.35	0.004 9102	+18.67	-4.69	-0.304	08 23 42.10

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Semi- diameter.	Equation of Time. App.-Mean	Var. per Hour.	Sidereal Time.
May	^{h m s} 17 03 31 08.60	^s 9.898	^{° ' "} +19 03 29.4	["] +34.80	^{' "} 15 50.37	^{m s} + 3 46.55	^s -0.042	^{h m s} 15 34 55.16
	18 03 35 06.44	9.922	19 17 14.9	33.99	15 50.18	3 45.27	0.065	15 38 51.71
	19 03 39 04.84	9.945	19 30 40.8	33.17	15 49.99	3 43.43	0.088	15 42 48.27
	20 03 43 03.80	9.968	19 43 46.8	32.33	15 49.80	3 41.03	0.111	15 46 44.83
	21 03 47 03.30	9.990	19 56 32.6	31.48	15 49.62	3 38.09	0.134	15 50 41.39
	22 03 51 03.33	10.012	+20 08 57.9	+30.62	15 49.45	+ 3 34.62	-0.156	15 54 37.94
	23 03 55 03.88	10.034	20 21 02.5	29.76	15 49.27	3 30.63	0.177	15 58 34.50
	24 03 59 04.93	10.055	20 32 46.1	28.88	15 49.10	3 26.12	0.198	16 02 31.06
	25 04 03 06.49	10.075	20 44 08.5	27.99	15 48.94	3 21.12	0.219	16 06 27.62
	26 04 07 08.54	10.095	20 55 09.5	27.09	15 48.78	3 15.63	0.239	16 10 24.17
	27 04 11 11.07	10.115	+21 05 48.8	+26.18	15 48.62	+ 3 09.66	-0.258	16 14 20.73
	28 04 15 14.06	10.134	21 16 06.2	25.27	15 48.47	3 03.23	0.278	16 18 17.29
	29 04 19 17.51	10.153	21 26 01.6	24.35	15 48.31	2 56.34	0.297	16 22 13.85
	30 04 23 21.41	10.172	21 35 34.8	23.42	15 48.16	2 48.99	0.315	16 26 10.40
	31 04 27 25.76	10.190	21 44 45.5	22.48	15 48.02	2 41.21	0.333	16 30 06.96
June	1 04 31 30.53	10.208	+21 53 33.6	+21.53	15 47.87	+ 2 32.99	-0.351	16 34 03.52
	2 04 35 35.73	10.225	22 01 59.0	20.58	15 47.73	2 24.35	0.368	16 38 00.08
	3 04 39 41.33	10.242	22 10 01.4	19.62	15 47.59	2 15.31	0.385	16 41 56.64
	4 04 43 47.33	10.258	22 17 40.7	18.65	15 47.45	2 05.86	0.402	16 45 53.20
	5 04 47 53.72	10.274	22 24 56.7	17.68	15 47.32	1 56.04	0.417	16 49 49.75
	6 04 52 00.47	10.289	+22 31 49.3	+16.70	15 47.19	+ 1 45.84	-0.432	16 53 46.31
	7 04 56 07.57	10.303	22 38 18.3	15.71	15 47.06	1 35.30	0.446	16 57 42.87
	8 05 00 15.01	10.317	22 44 23.5	14.72	15 46.94	1 24.42	0.460	17 01 39.43
	9 05 04 22.76	10.329	22 50 04.9	13.72	15 46.82	1 13.23	0.473	17 05 35.99
	10 05 08 30.80	10.341	22 55 22.2	12.72	15 46.70	1 01.74	0.484	17 09 32.55
	11 05 12 39.12	10.352	+23 00 15.4	+11.71	15 46.59	+ 0 49.99	-0.495	17 13 29.10
	12 05 16 47.68	10.362	23 04 44.3	10.70	15 46.49	0 37.98	0.505	17 17 25.66
	13 05 20 56.47	10.371	23 08 48.9	9.68	15 46.39	0 25.75	0.514	17 21 22.22
	14 05 25 05.47	10.379	23 12 28.9	8.66	15 46.29	0 13.31	0.522	17 25 18.78
	15 05 29 14.64	10.385	23 15 44.4	7.63	15 46.20	+ 0 00.70	0.529	17 29 15.34
	16 05 33 23.96	10.391	+23 18 35.3	+ 6.60	15 46.11	- 0 12.06	-0.535	17 33 11.90
	17 05 37 33.40	10.396	23 21 01.5	5.57	15 46.03	0 24.95	0.539	17 37 08.46
	18 05 41 42.94	10.399	23 23 02.9	4.54	15 45.96	0 37.93	0.542	17 41 05.01
	19 05 45 52.55	10.401	23 24 39.5	3.51	15 45.89	0 50.97	0.545	17 45 01.57
	20 05 50 02.19	10.402	23 25 51.3	2.47	15 45.83	1 04.06	0.546	17 48 58.13
	21 05 54 11.84	10.402	+23 26 38.2	+ 1.44	15 45.77	- 1 17.15	-0.545	17 52 54.69
	22 05 58 21.48	10.401	23 27 00.3	+ 0.40	15 45.72	1 30.23	0.544	17 56 51.25
	23 06 02 31.07	10.399	23 26 57.5	- 0.63	15 45.67	1 43.26	0.542	18 00 47.81
	24 06 06 40.60	10.395	23 26 30.0	1.66	15 45.63	1 56.23	0.539	18 04 44.37
	25 06 10 50.04	10.391	23 25 37.7	2.70	15 45.59	2 09.11	0.535	18 08 40.93
	26 06 14 59.37	10.386	+23 24 20.6	- 3.73	15 45.55	- 2 21.88	-0.530	18 12 37.48
	27 06 19 08.57	10.380	23 22 38.9	4.75	15 45.52	2 34.52	0.524	18 16 34.04
	28 06 23 17.61	10.374	23 20 32.5	5.78	15 45.49	2 47.01	0.517	18 20 30.60
	29 06 27 26.49	10.366	23 18 01.6	6.80	15 45.47	2 59.33	0.510	18 24 27.16
	30 06 31 35.18	10.358	23 15 06.2	7.82	15 45.45	3 11.46	0.501	18 28 23.72
July	1 06 35 43.67	10.349	+23 11 46.4	- 8.83	15 45.43	- 3 23.39	-0.492	18 32 20.28
	2 06 39 51.93	10.339	+23 08 02.3	- 9.84	15 45.41	- 3 35.10	-0.483	18 36 16.84

Date.	Mean Equinox of 1931.0.		Logarithm of Radius Vector of the Earth.	Prec. in Long.	Nut. in Long.	Nut. in. R.A.	Transit of First Point of Aries.		
	Longitude.	Latitude.							
May	17	55° 08' 12".1 3469.2	+0.35	0.004 9102 + 890	+18.67	-4.69	-0.304	08 23 42.10	
	18	56 06 01.3 3467.7	0.44	0.004 9992 + 870	18.81	4.66	.301	08 19 46.19	
	19	57 03 49.0 3466.3	0.50	0.005 0862 849	18.95	4.63	.295	08 15 50.27	
	20	58 01 35.3 3464.9	0.55	0.005 1711 829	19.08	4.60	.286	08 11 54.36	
	21	58 59 20.2 3463.2	0.56	0.005 2540 809	19.22	4.56	.277	08 07 58.45	
	22	59 57 03.4 3461.7	+0.54	0.005 3349 + 789	+19.36	-4.53	-0.269	08 04 02.54	
	23	60 54 45.1 3460.2	0.49	0.005 4138 771	19.50	4.49	.263	08 00 06.63	
	24	61 52 25.3 3458.6	0.42	0.005 4909 754	19.63	4.46	.260	07 56 10.72	
	25	62 50 03.9 3457.0	0.31	0.005 5663 738	19.77	4.42	.261	07 52 14.80	
	26	63 47 40.9 3455.6	0.18	0.005 6401 724	19.91	4.38	.264	07 48 18.89	
	27	64 45 16.5 3454.0	+0.03	0.005 7125 + 710	+20.05	-4.34	-0.268	07 44 22.98	
	28	65 42 50.5 3452.7	-0.11	0.005 7835 697	20.19	4.30	.272	07 40 27.07	
	29	66 40 23.2 3451.4	0.25	0.005 8532 685	20.32	4.26	.273	07 36 31.16	
	30	67 37 54.6 3450.2	0.39	0.005 9217 675	20.46	4.22	.271	07 32 35.24	
	31	68 35 24.8 3449.0	0.50	0.005 9892 663	20.60	4.17	.266	07 28 39.33	
	June	1	69 32 53.8 3448.1	-0.58	0.006 0555 + 652	+20.74	-4.13	-0.258	07 24 43.42
		2	70 30 21.9 3447.1	0.64	0.006 1207 641	20.87	4.08	.248	07 20 47.51
		3	71 27 49.0 3446.3	0.67	0.006 1848 627	21.01	4.04	.239	07 16 51.60
		4	72 25 15.3 3445.5	0.68	0.006 2475 614	21.15	3.99	.231	07 12 55.68
		5	73 22 40.8 3444.8	0.65	0.006 3089 599	21.29	3.94	.225	07 08 59.77
		6	74 20 05.6 3444.2	-0.59	0.006 3688 + 583	+21.42	-3.89	-0.222	07 05 03.86
		7	75 17 29.8 3443.5	0.51	0.006 4271 565	21.56	3.85	.222	07 01 07.95
		8	76 14 53.3 3442.9	0.42	0.006 4836 547	21.70	3.80	.223	06 57 12.03
		9	77 12 16.2 3442.4	0.32	0.006 5383 528	21.84	3.75	.226	06 53 16.12
		10	78 09 38.6 3441.9	0.21	0.006 5911 507	21.97	3.69	.230	06 49 20.21
		11	79 07 00.5 3441.4	-0.09	0.006 6418 + 486	+22.11	-3.64	-0.233	06 45 24.30
		12	80 04 21.9 3440.8	+0.03	0.006 6904 463	22.25	3.59	.234	06 41 28.38
		13	81 01 42.7 3440.3	0.13	0.006 7367 439	22.39	3.54	.233	06 37 32.47
		14	81 59 03.0 3439.8	0.23	0.006 7806 415	22.52	3.49	.230	06 33 36.56
		15	82 56 22.8 3439.2	0.30	0.006 8221 390	22.66	3.43	.223	06 29 40.65
		16	83 53 42.0 3438.6	+0.34	0.006 8611 + 363	+22.80	-3.38	-0.214	06 25 44.73
17		84 51 00.6 3438.0	0.35	0.006 8974 338	22.94	3.33	.203	06 21 48.82	
18		85 48 18.6 3437.4	0.34	0.006 9312 313	23.08	3.27	.193	06 17 52.91	
19		86 45 36.0 3436.6	0.31	0.006 9625 288	23.21	3.22	.185	06 13 56.99	
20		87 42 52.6 3436.0	0.24	0.006 9913 264	23.35	3.16	.180	06 10 01.08	
21		88 40 08.6 3435.2	+0.14	0.007 0177 + 240	+23.49	-3.11	-0.178	06 06 05.17	
22		89 37 23.8 3434.5	+0.02	0.007 0417 220	23.63	3.06	.180	06 02 09.26	
23		90 34 38.3 3433.8	-0.12	0.007 0637 199	23.76	3.00	.183	05 58 13.34	
24		91 31 52.1 3433.2	0.26	0.007 0836 181	23.90	2.95	.186	05 54 17.43	
25		92 29 05.3 3432.6	0.40	0.007 1017 163	24.04	2.89	.188	05 50 21.52	
26		93 26 17.9 3432.1	-0.53	0.007 1180 + 147	+24.18	-2.84	-0.186	05 46 25.61	
27		94 23 30.0 3431.6	0.64	0.007 1327 131	24.31	2.78	.182	05 42 29.69	
28		95 20 41.6 3431.3	0.73	0.007 1458 117	24.45	2.73	.174	05 38 33.78	
29		96 17 52.9 3431.0	0.80	0.007 1575 103	24.59	2.68	.164	05 34 37.87	
30		97 15 03.9 3430.9	0.83	0.007 1678 88	24.73	2.62	.154	05 30 41.95	
July	1	98 12 14.8 3430.8	-0.83	0.007 1766 + 73	+24.86	-2.57	-0.146	05 26 46.04	
	2	99 09 25.6	-0.80	0.007 1839	+25.00	-2.52	-0.139	05 22 50.13	

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Semi- diameter.	Equation of Time. App.—Mean	Var. per Hour.	Sidereal Time.
July	^h ^m ^s	^s	[°] ['] ["]	["]	['] ["]	^m ^s	^s	^h ^m ^s
1	06 35 43·67	10·349	+23 11 46·4	-8·83	15 45·43	-3 23·39	-0·492	18 32 20·28
2	06 39 51·93	10·339	23 08 02·3	9·84	15 45·41	3 35·10	0·483	18 36 16·84
3	06 43 59·95	10·329	23 03 53·9	10·85	15 45·40	3 46·56	0·472	18 40 13·39
4	06 48 07·72	10·318	22 59 21·4	11·86	15 45·39	3 57·76	0·461	18 44 09·95
5	06 52 15·20	10·306	22 54 24·9	12·86	15 45·38	4 08·69	0·449	18 48 06·51
6	06 56 22·39	10·293	+22 49 04·4	-13·85	15 45·38	-4 19·32	-0·437	18 52 03·07
7	07 00 29·26	10·280	22 43 20·1	14·84	15 45·38	4 29·64	0·423	18 55 59·63
8	07 04 35·80	10·265	22 37 12·1	15·82	15 45·39	4 39·62	0·409	18 59 56·19
9	07 08 41·99	10·250	22 30 40·5	16·80	15 45·40	4 49·25	0·394	19 03 52·74
10	07 12 47·81	10·234	22 23 45·6	17·77	15 45·42	4 58·51	0·378	19 07 49·30
11	07 16 53·24	10·218	+22 16 27·4	-18·74	15 45·44	-5 07·38	-0·361	19 11 45·86
12	07 20 58·26	10·201	22 08 46·1	19·70	15 45·46	5 15·84	0·344	19 15 42·42
13	07 25 02·86	10·182	22 00 41·9	20·65	15 45·49	5 23·88	0·326	19 19 38·98
14	07 29 07·01	10·163	21 52 15·0	21·59	15 45·53	5 31·48	0·307	19 23 35·54
15	07 33 10·70	10·144	21 43 25·6	22·53	15 45·57	5 38·61	0·287	19 27 32·09
16	07 37 13·91	10·123	+21 34 13·8	-23·45	15 45·62	-5 45·25	-0·267	19 31 28·65
17	07 41 16·61	10·102	21 24 40·0	24·37	15 45·67	5 51·40	0·245	19 35 25·21
18	07 45 18·79	10·080	21 14 44·3	25·27	15 45·73	5 57·03	0·223	19 39 21·77
19	07 49 20·44	10·057	21 04 26·9	26·17	15 45·80	6 02·12	0·201	19 43 18·33
20	07 53 21·54	10·034	20 53 48·2	27·05	15 45·87	6 06·66	0·178	19 47 14·88
21	07 57 22·07	10·010	+20 42 48·3	-27·93	15 45·94	-6 10·63	-0·154	19 51 11·44
22	08 01 22·03	9·986	20 31 27·6	28·79	15 46·02	6 14·03	0·130	19 55 08·00
23	08 05 21·41	9·962	20 19 46·3	29·65	15 46·11	6 16·85	0·105	19 59 04·56
24	08 09 20·19	9·937	20 07 44·6	30·49	15 46·20	6 19·08	0·080	20 03 01·11
25	08 13 18·38	9·912	19 55 22·8	31·32	15 46·29	6 20·70	0·055	20 06 57·67
26	08 17 15·96	9·887	+19 42 41·2	-32·14	15 46·39	-6 21·73	-0·030	20 10 54·23
27	08 21 12·95	9·862	19 29 40·0	32·95	15 46·48	6 22·16	-0·005	20 14 50·79
28	08 25 09·33	9·837	19 16 19·5	33·75	15 46·58	6 21·98	+0·020	20 18 47·34
29	08 29 05·10	9·811	19 02 39·9	34·54	15 46·69	6 21·20	0·045	20 22 43·90
30	08 33 00·28	9·786	18 48 41·5	35·32	15 46·80	6 19·82	0·070	20 26 40·46
31	08 36 54·85	9·761	+18 34 24·6	-36·09	15 46·91	-6 17·84	+0·095	20 30 37·01
Aug. 1	08 40 48·82	9·736	18 19 49·4	36·84	15 47·02	6 15·26	0·120	20 34 33·57
2	08 44 42·20	9·712	18 04 56·1	37·59	15 47·14	6 12·08	0·145	20 38 30·13
3	08 48 34·98	9·687	17 49 45·1	38·32	15 47·26	6 08·30	0·170	20 42 26·68
4	08 52 27·17	9·662	17 34 16·6	39·05	15 47·38	6 03·93	0·194	20 46 23·24
5	08 56 18·78	9·638	+17 18 30·9	-39·76	15 47·51	-5 58·98	+0·219	20 50 19·80
6	09 00 09·79	9·614	17 02 28·3	40·46	15 47·64	5 53·44	0·243	20 54 16·35
7	09 04 00·23	9·589	16 46 09·1	41·14	15 47·77	5 47·32	0·267	20 58 12·91
8	09 07 50·08	9·565	16 29 33·5	41·82	15 47·91	5 40·62	0·291	21 02 09·47
9	09 11 39·37	9·541	16 12 41·9	42·48	15 48·05	5 33·34	0·315	21 06 06·02
10	09 15 28·08	9·518	+15 55 34·5	-43·13	15 48·20	-5 25·50	+0·339	21 10 02·58
11	09 19 16·23	9·494	15 38 11·6	43·77	15 48·35	5 17·09	0·362	21 13 59·13
12	09 23 03·81	9·471	15 20 33·6	44·39	15 48·50	5 08·12	0·385	21 17 55·69
13	09 26 50·84	9·448	15 02 40·8	45·00	15 48·66	4 58·59	0·409	21 21 52·25
14	09 30 37·31	9·425	14 44 33·5	45·60	15 48·83	4 48·50	0·432	21 25 48·80
15	09 34 23·22	9·402	+14 26 12·1	-46·18	15 49·00	-4 37·86	+0·455	21 29 45·36
16	09 38 08·59	9·379	+14 07 36·9	-46·75	15 49·17	-4 26·67	+0·478	21 33 41·91

Date.	Mean Equinox of 1931-0.		Logarithm of Radius Vector of the Earth.	Prec. in Long.	Nut. in Long.	Nut. in R.A.	Transit of First Point of Aries.	
	Longitude.	Latitude.						
July	1	98 12 14.8 3430.8	-0.83	0.007 1766	+24.86	-2.57	-0.146	h m s 05 26 46.04
	2	99 09 25.6 3430.9	0.80	.007 1839	+ 73 25.00	2.52	.139	05 22 50.13
	3	100 06 36.5 3430.9	0.75	.007 1897	58 25.14	2.47	.135	05 18 54.22
	4	101 03 47.4 3431.2	0.67	.007 1939	42 25.28	2.42	.133	05 14 58.30
	5	102 00 58.6 3431.3	0.58	.007 1965	26 25.41	2.37	.135	05 11 02.39
	6	102 58 09.9 3431.6	-0.48	0.007 1973	+ 8 +25.55	-2.32	-0.137	05 07 06.48
	7	103 55 21.5 3432.0	0.37	.007 1962	- 11 25.69	2.26	.141	05 03 10.57
	8	104 52 33.5 3432.3	0.25	.007 1932	30 25.83	2.22	.144	04 59 14.65
	9	105 49 45.8 3432.7	0.13	.007 1881	51 25.97	2.17	.146	04 55 18.74
	10	106 46 58.5 3433.2	-0.03	.007 1810	71 26.10	2.12	.147	04 51 22.83
	11	107 44 11.7 3433.6	+0.07	0.007 1716	94 +26.24	-2.07	-0.144	04 47 26.92
	12	108 41 25.3 3434.0	0.15	.007 1598	- 118 26.38	2.03	.139	04 43 31.00
	13	109 38 39.3 3434.4	0.20	.007 1456	142 26.52	1.98	.131	04 39 35.09
	14	110 35 53.7 3434.8	0.22	.007 1289	167 26.65	1.94	.121	04 35 39.18
	15	111 33 08.5 3435.2	0.21	.007 1096	193 26.79	1.89	.112	04 31 43.27
	16	112 30 23.7 3435.6	+0.18	0.007 0876	220 +26.93	-1.85	-0.103	04 27 47.36
	17	113 27 39.3 3435.8	0.11	.007 0629	- 247 27.07	1.81	.097	04 23 51.44
	18	114 24 55.1 3436.0	+0.02	.007 0356	273 27.20	1.77	.095	04 19 55.53
	19	115 22 11.1 3436.3	-0.10	.007 0058	298 27.34	1.73	.096	04 15 59.62
	20	116 19 27.4 3436.5	0.23	.006 9736	322 27.48	1.69	.100	04 12 03.71
	21	117 16 43.9 3436.8	-0.38	0.006 9390	346 +27.62	-1.65	-0.104	04 08 07.80
	22	118 14 00.7 3436.9	0.52	.006 9023	- 367 27.75	1.62	.107	04 04 11.89
	23	119 11 17.6 3437.3	0.64	.006 8635	388 27.89	1.58	.108	04 00 15.97
	24	120 08 34.9 3437.5	0.75	.006 8230	405 28.03	1.55	.106	03 56 20.06
	25	121 05 52.4 3438.0	0.84	.006 7807	423 28.17	1.51	.101	03 52 24.15
	26	122 03 10.4 3438.5	-0.91	0.006 7369	438 +28.30	-1.48	-0.093	03 48 28.24
	27	123 00 28.9 3439.0	0.94	.006 6916	- 453 28.44	1.45	.084	03 44 32.33
	28	123 57 47.9 3439.7	0.94	.006 6448	468 28.58	1.42	.076	03 40 36.42
	29	124 55 07.6 3440.4	0.90	.006 5967	481 28.72	1.39	.070	03 36 40.51
	30	125 52 28.0 3441.2	0.85	.006 5473	494 28.86	1.37	.067	03 32 44.59
Aug.	31	126 49 49.2 3442.2	-0.77	0.006 4966	507 +28.99	-1.34	-0.067	03 28 48.68
	1	127 47 11.4 3443.1	0.68	.006 4445	- 521 29.13	1.31	.069	03 24 52.77
	2	128 44 34.5 3444.2	0.57	.006 3910	535 29.27	1.29	.073	03 20 56.86
	3	129 41 58.7 3445.3	0.45	.006 3361	549 29.41	1.27	.078	03 17 00.95
	4	130 39 24.0 3446.4	0.33	.006 2798	563 29.54	1.25	.083	03 13 05.04
	5	131 36 50.4 3447.6	-0.21	0.006 2219	579 +29.68	-1.23	-0.088	03 09 09.13
	6	132 34 18.0 3449.0	-0.10	.006 1623	- 596 29.82	1.21	.091	03 05 13.22
	7	133 31 47.0 3450.2	0.00	.006 1011	612 29.96	1.20	.091	03 01 17.31
	8	134 29 17.2 3451.5	+0.08	.006 0381	630 30.09	1.18	.089	02 57 21.40
	9	135 26 48.7 3452.9	0.13	.005 9732	649 30.23	1.17	.084	02 53 25.49
	10	136 24 21.6 3454.2	+0.16	0.005 9063	669 +30.37	-1.16	-0.077	02 49 29.58
	11	137 21 55.8 3455.6	0.16	.005 8373	- 690 30.51	1.14	.069	02 45 33.67
	12	138 19 31.4 3456.9	0.13	.005 7662	711 30.64	1.13	.062	02 41 37.76
	13	139 17 08.3 3458.1	+0.08	.005 6928	734 30.78	1.13	.057	02 37 41.85
	14	140 14 46.4 3459.3	-0.01	.005 6170	758 30.92	1.12	.055	02 33 45.94
	15	141 12 25.7 3460.5	-0.14	0.005 5390	780 +31.06	-1.11	-0.057	02 29 50.03
16	142 10 06.2	-0.27	0.005 4587	- 803 +31.19	-1.11	-0.062	02 25 54.12	

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Semi- diameter.	Equation of Time. App.-Mean	Var. per Hour.	Sidereal Time.
	^h ^m ^s	^s	[°] ['] ["]	["]	['] ["]	^m ^s	^s	^h ^m ^s
Aug. 16	09 38 08.59	9.379	+14 07 36.9	-46.75	15 49.17	- 4 26.67	+0.478	21 33 41.91
17	09 41 53.41	9.356	13 48 48.2	47.30	15 49.35	4 14.94	0.500	21 37 38.47
18	09 45 37.69	9.334	13 29 46.4	47.84	15 49.54	4 02.67	0.522	21 41 35.02
19	09 49 21.45	9.312	13 10 31.9	48.37	15 49.73	3 49.87	0.544	21 45 31.58
20	09 53 04.68	9.291	12 51 04.9	48.88	15 49.92	3 36.55	0.566	21 49 28.14
21	09 56 47.41	9.270	+12 31 25.9	-49.37	15 50.12	- 3 22.72	+0.587	21 53 24.69
22	10 00 29.63	9.249	12 11 35.0	49.86	15 50.32	3 08.39	0.607	21 57 21.25
23	10 04 11.38	9.229	11 51 32.7	50.33	15 50.52	2 53.58	0.627	22 01 17.80
24	10 07 52.65	9.210	11 31 19.3	50.79	15 50.72	2 38.30	0.646	22 05 14.36
25	10 11 33.48	9.192	11 10 55.0	51.23	15 50.93	2 22.57	0.665	22 09 10.91
26	10 15 13.87	9.174	+10 50.20.1	-51.67	15 51.14	- 2 06.41	+0.682	22 13 07.47
27	10 18 53.84	9.157	10 29 35.0	52.09	15 51.35	1 49.82	0.699	22 17 04.02
28	10 22 33.42	9.141	10 08 39.9	52.50	15 51.56	1 32.84	0.716	22 21 00.58
29	10 26 12.61	9.125	9 47 35.2	52.89	15 51.78	1 15.48	0.731	22 24 57.13
30	10 29 51.44	9.111	9 26 21.2	53.28	15 51.99	0 57.76	0.746	22 28 53.68
31	10 33 29.93	9.097	+ 9 04.58.0	-53.65	15 52.21	- 0 39.69	+0.760	22 32 50.24
Sept. 1	10 37 08.09	9.084	8 43 26.2	54.01	15 52.43	0 21.30	0.773	22 36 46.79
2	10 40 45.94	9.071	8 21 45.8	54.35	15 52.65	- 0 02.60	0.785	22 40 43.35
3	10 44 23.51	9.059	7 59 57.3	54.68	15 52.88	+ 0 16.39	0.797	22 44 39.90
4	10 48 00.80	9.049	7 38 01.0	55.00	15 53.10	0 35.65	0.808	22 48 36.46
5	10 51 37.85	9.039	+ 7 15 57.2	-55.31	15 53.33	+ 0 55.16	+0.818	22 52 33.01
6	10 55 14.66	9.029	6 53 46.1	55.61	15 53.56	1 14.90	0.827	22 56 29.56
7	10 58 51.25	9.021	6 31 28.1	55.89	15 53.79	1 34.86	0.836	23 00 26.12
8	11 02 27.65	9.013	6 09 03.5	56.16	15 54.03	1 55.02	0.844	23 04 22.67
9	11 06 03.87	9.006	5 46 32.7	56.41	15 54.27	2 15.35	0.851	23 08 19.23
10	11 09 39.93	8.999	+ 5 23 56.0	-56.65	15 54.51	+ 2 35.85	+0.857	23 12 15.78
11	11 13 15.84	8.993	5 01 13.7	56.87	15 54.75	2 56.49	0.863	23 16 12.33
12	11 16 51.61	8.988	4 38 26.3	57.08	15 55.00	3 17.27	0.868	23 20 08.89
13	11 20 27.27	8.983	4 15 34.0	57.27	15 55.25	3 38.17	0.873	23 24 05.44
14	11 24 02.82	8.979	3 52 37.2	57.45	15 55.51	3 59.18	0.877	23 28 02.00
15	11 27 38.28	8.976	+ 3 29 36.4	-57.61	15 55.76	+ 4 20.27	+0.880	23 31 58.55
16	11 31 13.67	8.973	3 06 31.8	57.76	15 56.02	4 41.43	0.883	23 35 55.10
17	11 34 49.00	8.971	2 43 23.8	57.89	15 56.29	5 02.65	0.885	23 39 51.66
18	11 38 24.30	8.970	2 20 12.9	58.01	15 56.56	5 23.91	0.886	23 43 48.21
19	11 41 59.57	8.970	1 56 59.3	58.12	15 56.82	5 45.19	0.887	23 47 44.76
20	11 45 34.85	8.970	+ 1 33 43.3	-58.21	15 57.09	+ 6 06.47	+0.886	23 51 41.32
21	11 49 10.15	8.972	1 10 25.3	58.28	15 57.36	6 27.72	0.885	23 55 37.87
22	11 52 45.49	8.974	0 47 05.7	58.35	15 57.64	6 48.93	0.883	23 59 34.43
23	11 56 20.90	8.977	0 23 44.7	58.40	15 57.91	7 10.08	0.879	00 03 30.98
24	11 59 56.40	8.981	+ 0 00 22.6	58.44	15 58.18	7 31.13	0.875	00 07 27.53
25	12 03 32.02	8.987	- 0 23 00.2	-58.46	15 58.45	+ 7 52.07	+0.870	00 11 24.09
26	12 07 07.77	8.993	0 46 23.4	58.47	15 58.72	8 12.87	0.864	00 15 20.64
27	12 10 43.68	9.000	1 09 46.6	58.47	15 59.00	8 33.52	0.857	00 19 17.19
28	12 14 19.77	9.008	1 33 09.7	58.45	15 59.27	8 53.98	0.848	00 23 13.75
29	12 17 56.07	9.017	1 56 32.2	58.42	15 59.54	9 14.23	0.839	00 27 10.30
30	12 21 32.60	9.027	- 2 19 53.8	-58.38	15 59.81	+ 9 34.26	+0.829	00 31 06.85
Oct. 1	12 25 09.38	9.038	- 2 43 14.2	-58.32	16 00.08	+ 9 54.03	+0.818	00 35 03.41

Date.	Mean Equinox of 1931.0.		Logarithm of Radius Vector of the Earth.	Prec. in Long.	Nut. in Long.	Nut. in R.A.	Transit of First Point of Aries.
	Longitude.	Latitude.					
Aug. 16	142° 10' 06".2 3461".6	-0.27	0.005 4587 - 824	+31".19	-1".11	-0.062	^h ^m ^s 02 25 54.12
17	143 07 47.8 3462.7	0.41	0.005 3763 846	31.33	1.11	.068	02 21 58.21
18	144 05 30.5 3463.8	0.55	0.005 2917 864	31.47	1.11	.074	02 18 02.30
19	145 03 14.3 3464.8	0.68	0.005 2053 882	31.61	1.11	.078	02 14 06.39
20	146 00 59.1 3465.8	0.79	0.005 1171 897	31.75	1.11	.079	02 10 10.48
21	146 58 44.9 3467.0	-0.88	0.005 0274 - 912	+31.88	-1.11	-0.077	02 06 14.57
22	147 56 31.9 3468.1	0.94	0.004 9362 924	32.02	1.11	.072	02 02 18.66
23	148 54 20.0 3469.3	0.98	0.004 8438 935	32.16	1.12	.065	01 58 22.75
24	149 52 09.3 3470.5	0.98	0.004 7503 946	32.30	1.12	.059	01 54 26.84
25	150 49 59.8 3471.9	0.95	0.004 6557 954	32.43	1.13	.055	01 50 30.94
26	151 47 51.7 3473.3	-0.90	0.004 5603 - 963	+32.57	-1.14	-0.053	01 46 35.03
27	152 45 45.0 3474.8	0.82	0.004 4640 971	32.71	1.15	.054	01 42 39.12
28	153 43 39.8 3476.4	0.73	0.004 3669 979	32.85	1.16	.057	01 38 43.21
29	154 41 36.2 3477.9	0.61	0.004 2690 986	32.98	1.17	.063	01 34 47.30
30	155 39 34.1 3479.7	0.49	0.004 1704 994	33.12	1.18	.070	01 30 51.39
Sept. 31	156 37 33.8 3481.4	-0.37	0.004 0710 - 1001	+33.26	-1.20	-0.078	01 26 55.48
1	157 35 35.2 3483.2	0.24	0.003 9709 1010	33.40	1.21	.085	01 22 59.57
2	158 33 38.4 3485.1	0.12	0.003 8699 1018	33.53	1.23	.090	01 19 03.67
3	159 31 43.5 3487.0	-0.01	0.003 7681 1027	33.67	1.25	.094	01 15 07.76
4	160 29 50.5 3489.0	+0.08	0.003 6654 1037	33.81	1.26	.095	01 11 11.85
5	161 27 59.5 3490.9	+0.15	0.003 5617 - 1047	+33.95	-1.28	-0.093	01 07 15.94
6	162 26 10.4 3493.0	0.20	0.003 4570 1058	34.08	1.30	.088	01 03 20.03
7	163 24 23.4 3495.0	0.20	0.003 3512 1071	34.22	1.32	.083	00 59 24.12
8	164 22 38.4 3497.1	0.18	0.003 2441 1084	34.36	1.34	.078	00 55 28.22
9	165 20 55.5 3499.0	0.13	0.003 1357 1098	34.50	1.37	.074	00 51 32.31
10	166 19 14.5 3501.1	+0.05	0.003 0259 - 1114	+34.64	-1.39	-0.073	00 47 36.40
11	167 17 35.6 3502.9	-0.06	0.002 9145 1129	34.77	1.41	.075	00 43 40.49
12	168 15 58.5 3504.8	0.18	0.002 8016 1145	34.91	1.44	.081	00 39 44.58
13	169 14 23.3 3506.6	0.31	0.002 6871 1160	35.05	1.46	.089	00 35 48.68
14	170 12 49.9 3508.3	0.45	0.002 5711 1174	35.19	1.49	.097	00 31 52.77
15	171 11 18.2 3510.0	-0.59	0.002 4537 - 1187	+35.32	-1.51	-0.103	00 27 56.86
16	172 09 48.2 3511.6	0.71	0.002 3350 1199	35.46	1.54	.106	00 24 00.95
17	173 08 19.8 3513.2	0.81	0.002 2151 1208	35.60	1.56	.105	00 20 05.04
18	174 06 53.0 3514.8	0.88	0.002 0943 1217	35.74	1.59	.102	00 16 09.14
19	175 05 27.8 3516.5	0.92	0.001 9726 1222	35.87	1.62	.098	00 12 13.23
20	176 04 04.3 3518.1	-0.93	0.001 8504 - 1228	+36.01	-1.65	-0.093	00 08 17.32
21	177 02 42.4 3519.8	0.91	0.001 7276 1230	36.15	1.67	.089	00 04 21.41
22	178 01 22.2 3521.6	0.86	0.001 6046 1232	36.29	1.70	.087	^{00 00 25.50} ^{ 23 56 29.60 }
23	179 00 03.8 3523.3	0.79	0.001 4814 1233	36.42	1.73	.088	23 52 33.69
24	179 58 47.1 3525.2	0.70	0.001 3581 1234	36.56	1.76	.092	23 48 37.78
25	180 57 32.3 3527.1	-0.58	0.001 2347 - 1232	+36.70	-1.78	-0.098	23 44 41.87
26	181 56 19.4 3529.1	0.45	0.001 1115 1232	36.84	1.81	.106	23 40 45.96
27	182 55 08.5 3531.1	0.31	0.000 9883 1229	36.97	1.84	.114	23 36 50.06
28	183 53 59.6 3533.1	0.17	0.000 8654 1228	37.11	1.87	.123	23 32 54.15
29	184 52 52.7 3535.3	-0.04	0.000 7426 1226	37.25	1.90	.130	23 28 58.24
30	185 51 48.0 3537.4	+0.08	0.000 6200 - 1224	+37.39	-1.92	-0.134	23 25 02.33
Oct. 1	186 50 45.4	+0.18	0.000 4976	+37.53	-1.95	-0.136	23 21 06.43

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Semi- diameter.	Equation of Time. App.-Mean	Var. per Hour.	Sidereal Time.
Oct. 1	^h 12 ^m 25 ^s 09.38	^s 9.038	[°] - 2 ['] 43 ["] 14.2	["] -58.32	['] 16 00.08	^m + 9 ^s 54.03	^s +0.818	^h 00 ^m 35 ^s 03.41
2	12 28 46.43	9.050	3 06 33.0	58.25	16 00.35	10 13.53	0.806	00 38 59.96
3	12 32 23.79	9.063	3 29 50.0	58.16	16 00.62	10 32.73	0.794	00 42 56.52
4	12 36 01.46	9.077	3 53 04.8	58.06	16 00.89	10 51.61	0.780	00 46 53.07
5	12 39 39.47	9.091	4 16 17.0	57.95	16 01.16	11 10.15	0.765	00 50 49.62
6	12 43 17.85	9.107	4 39 26.3	-57.82	16 01.43	+11 28.33	+0.750	00 54 46.18
7	12 46 56.61	9.123	5 02 32.3	57.68	16 01.70	11 46.12	0.733	00 58 42.73
8	12 50 35.77	9.140	5 25 34.7	57.52	16 01.97	12 03.52	0.716	01 02 39.29
9	12 54 15.35	9.158	5 48 33.1	57.34	16 02.24	12 20.49	0.698	01 06 35.84
10	12 57 55.37	9.177	6 11 27.0	57.15	16 02.52	12 37.02	0.680	01 10 32.39
11	13 01 35.84	9.196	- 6 34.16.1	-56.94	16 02.79	+12 53.11	+0.661	01 14 28.95
12	13 05 16.77	9.216	6 56 59.9	56.71	16 03.07	13 08.73	0.641	01 18 25.50
13	13 08 58.19	9.236	7 19 38.1	56.47	16 03.35	13 23.86	0.621	01 22 22.06
14	13 12 40.11	9.257	7 42 10.2	56.21	16 03.63	13 38.51	0.600	01 26 18.61
15	13 16 22.53	9.278	8 04 35.9	55.93	16 03.90	13 52.64	0.578	01 30 15.16
16	13 20 05.47	9.301	- 8 26 54.7	-55.63	16 04.18	+14 06.25	+0.556	01 34 11.72
17	13 23 48.96	9.323	8 49 06.2	55.32	16 04.46	14 19.32	0.533	01 38 08.27
18	13 27 33.00	9.347	9 11 10.0	54.99	16 04.74	14 31.83	0.510	01 42 04.83
19	13 31 17.62	9.371	9 33 05.8	54.65	16 05.02	14 43.77	0.485	01 46 01.38
20	13 35 02.82	9.396	9 54 53.2	54.29	16 05.30	14 55.11	0.460	01 49 57.94
21	13 38 48.64	9.422	-10 16 31.8	-53.92	16 05.58	+15 05.85	+0.435	01 53 54.49
22	13 42 35.08	9.448	10 38 01.3	53.53	16 05.85	15 15.96	0.408	01 57 51.05
23	13 46 22.17	9.476	10 59 21.2	53.12	16 06.12	15 25.43	0.381	02 01 47.60
24	13 50 09.92	9.504	11 20 31.1	52.70	16 06.39	15 34.24	0.353	02 05 44.16
25	13 53 58.35	9.532	11 41 30.8	52.27	16 06.66	15 42.37	0.324	02 09 40.71
26	13 57 47.47	9.562	-12 02 19.9	-51.81	16 06.93	+15 49.80	+0.295	02 13 37.27
27	14 01 37.31	9.592	12 22 57.8	51.35	16 07.19	15 56.52	0.265	02 17 33.82
28	14 05 27.87	9.622	12 43 24.4	50.86	16 07.45	16 02.50	0.234	02 21 30.38
29	14 09 19.18	9.654	13 03 39.2	50.36	16 07.70	16 07.75	0.203	02 25 26.93
30	14 13 11.26	9.686	13 23 41.7	49.85	16 07.96	16 12.23	0.171	02 29 23.49
31	14 17 04.11	9.718	-13 43 31.8	-49.32	16 08.21	+16 15.93	+0.138	02 33 20.04
Nov. 1	14 20 57.75	9.752	14 03 08.8	48.77	16 08.46	16 18.85	0.105	02 37 16.60
2	14 24 52.19	9.785	14 22 32.5	48.20	16 08.70	16 20.96	0.071	02 41 13.15
3	14 28 47.45	9.819	14 41 42.5	47.62	16 08.95	16 22.26	0.037	02 45 09.71
4	14 32 43.53	9.854	15 00 38.3	47.02	16 09.19	16 22.74	+0.002	02 49 06.27
5	14 36 40.45	9.889	-15 19 19.5	-46.41	16 09.43	+16 22.38	-0.033	02 53 02.82
6	14 40 38.21	9.924	15 37 45.7	45.77	16 09.67	16 21.17	0.068	02 56 59.38
7	14 44 36.81	9.959	15 55 56.5	45.12	16 09.90	16 19.12	0.103	03 00 55.93
8	14 48 36.26	9.995	16 13 51.5	44.45	16 10.14	16 16.23	0.138	03 04 52.49
9	14 52 36.56	10.030	16 31 30.2	43.76	16 10.37	16 12.48	0.174	03 08 49.05
10	14 56 37.71	10.066	-16 48 52.1	-43.06	16 10.60	+16 07.89	-0.209	03 12 45.60
11	15 00 39.71	10.101	17 05 56.9	42.34	16 10.83	16 02.45	0.244	03 16 42.16
12	15 04 42.56	10.136	17 22 44.2	41.59	16 11.06	15 56.16	0.279	03 20 38.72
13	15 08 46.24	10.171	17 39 13.4	40.83	16 11.29	15 49.03	0.314	03 24 35.27
14	15 12 50.76	10.206	17 55 24.2	40.06	16 11.52	15 41.07	0.349	03 28 31.83
15	15 16 56.12	10.240	-18 11 16.1	-39.27	16 11.74	+15 32.27	-0.384	03 32 28.39
16	15 21 02.30	10.275	-18 26 48.9	-38.46	16 11.96	+15 22.64	-0.418	03 36 24.95

Date.	Mean Equinox of 1931.0.		Logarithm of Radius Vector of the Earth.	Prec. in Long.	Nut. in Long.	Nut. in R.A.	Transit of First Point of Aries.	
	Longitude.	Latitude.						
Oct.	1	186° 50' 45".4 3539".6	+0".18	0.000 4976	+37".53	-1".95	-0.136	h m s 23 21 06.43
	2	187 49 45.0 3541.9	0.26	.000 3754 1222	37.66	1.98	.136	23 17 10.52
	3	188 48 46.9 3544.2	0.31	.000 2533 1221	37.80	2.00	.133	23 13 14.61
	4	189 47 51.1 3546.5	0.33	.000 1312 1220	37.94	2.03	.128	23 09 18.70
	5	190 46 57.6 3548.8	0.32	0.000 0092 1222	38.08	2.05	.123	23 05 22.79
	6	191 46 06.4 3551.2	+0.28	9.999 8870	+38.21	-2.08	-0.119	23 01 26.89
	7	192 45 17.6 3553.5	0.22	.999 7647 1226	38.35	2.10	.118	22 57 30.98
	8	193 44 31.1 3555.8	0.13	.999 6421 1230	38.49	2.12	.120	22 53 35.07
	9	194 43 46.9 3558.0	+0.02	.999 5191 1235	38.63	2.15	.124	22 49 39.16
	10	195 43 04.9 3560.2	-0.11	.999 3956 1240	38.76	2.17	.131	22 45 43.25
	11	196 42 25.1 3562.3	-0.25	9.999 2716	+38.90	-2.19	-0.139	22 41 47.35
	12	197 41 47.4 3564.3	0.39	.999 1471 1251	39.04	2.21	.145	22 37 51.44
	13	198 41 11.7 3566.3	0.51	.999 0220 1255	39.18	2.23	.149	22 33 55.53
	14	199 40 38.0 3568.1	0.61	.998 8965 1258	39.31	2.25	.149	22 29 59.62
	15	200 40 06.1 3569.8	0.68	.998 7707 1260	39.45	2.27	.146	22 26 03.71
	16	201 39 35.9 3571.7	-0.73	9.998 6447	+39.59	-2.28	-0.140	22 22 07.80
	17	202 39 07.6 3573.4	0.75	.998 5188 1258	39.73	2.30	.134	22 18 11.89
	18	203 38 41.0 3575.1	0.74	.998 3930 1254	39.86	2.31	.129	22 14 15.99
	19	204 38 16.1 3576.8	0.70	.998 2676 1248	40.00	2.32	.125	22 10 20.08
	20	205 37 52.9 3578.6	0.63	.998 1428 1242	40.14	2.34	.124	22 06 24.17
	21	206 37 31.5 3580.4	-0.53	9.998 0186	+40.28	-2.35	-0.126	22 02 28.26
	22	207 37 11.9 3582.1	0.42	.997 8952 1224	40.41	2.36	.131	21 58 32.35
	23	208 36 54.0 3584.0	0.30	.997 7728 1215	40.55	2.36	.137	21 54 36.44
	24	209 36 38.0 3585.8	0.17	.997 6513 1203	40.69	2.37	.144	21 50 40.53
	25	210 36 23.8 3587.7	-0.04	.997 5310 1192	40.83	2.38	.151	21 46 44.62
	26	211 36 11.5 3589.7	+0.10	9.997 4118	+40.97	-2.38	-0.157	21 42 48.71
	27	212 36 01.2 3591.6	0.22	.997 2939 1167	41.10	2.38	.161	21 38 52.80
	28	213 35 52.8 3593.6	0.32	.997 1772 1153	41.24	2.39	.162	21 34 56.89
	29	214 35 46.4 3595.7	0.41	.997 0619 1140	41.38	2.39	.161	21 31 00.99
	30	215 35 42.1 3597.7	0.47	.996 9479 1127	41.52	2.38	.157	21 27 05.08
Nov.	31	216 35 39.8 3599.9	+0.50	9.996 8352	+41.65	-2.38	-0.151	21 23 09.17
	1	217 35 39.7 3602.0	0.51	.996 7238 1103	41.79	2.38	.144	21 19 13.26
	2	218 35 41.7 3604.1	0.49	.996 6135 1091	41.93	2.37	.138	21 15 17.35
	3	219 35 45.8 3606.3	0.43	.996 5044 1080	42.07	2.36	.134	21 11 21.44
	4	220 35 52.1 3608.4	0.34	.996 3964 1072	42.20	2.35	.133	21 07 25.53
	5	221 36 00.5 3610.6	+0.24	9.996 2892	+42.34	-2.34	-0.135	21 03 29.62
	6	222 36 11.1 3612.6	+0.12	.996 1829 1063	42.48	2.33	.140	20 59 33.71
	7	223 36 23.7 3614.6	0.00	.996 0773 1056	42.62	2.32	.146	20 55 37.80
	8	224 36 38.3 3616.5	-0.13	.995 9724 1049	42.75	2.30	.151	20 51 41.88
	9	225 36 54.8 3618.4	0.26	.995 8680 1044	42.89	2.28	.153	20 47 45.97
	10	226 37 13.2 3620.1	-0.36	9.995 7641 1039	+43.03	-2.27	-0.152	20 43 50.06
	11	227 37 33.3 3621.7	0.45	.995 6607 1034	43.17	2.25	.148	20 39 54.15
	12	228 37 55.0 3623.2	0.51	.995 5580 1027	43.30	2.22	.140	20 35 58.24
	13	229 38 18.2 3624.7	0.54	.995 4560 1020	43.44	2.20	.131	20 32 02.33
	14	230 38 42.9 3626.1	0.53	.995 3548 1012	43.58	2.17	.123	20 28 06.42
	15	231 39 09.0 3627.5	-0.49	9.995 2547 1001	+43.72	-2.15	-0.116	20 24 10.51
16	232 39 36.5	-0.43	9.995 1557	+43.86	-2.12	-0.112	20 20 14.60	

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Semi- diameter.	Equation of Time. App.-Mean	Var. per Hour.	Sidereal Time.
Nov. 16	^h ^m ^s 15 21 02.30	^s 10.275	[°] ['] ["] -18 26 48.9	["] -38.46	['] ["] 16 11.96	^m ^s +15 22.64	^s -0.418	^h ^m ^s 03 36 24.95
17	15 25 09.31	10.309	18 42 02.0	37.63	16 12.18	15 12.19	0.453	03 40 21.50
18	15 29 17.15	10.343	18 56 55.2	36.79	16 12.40	15 00.91	0.487	03 44 18.06
19	15 33 25.80	10.377	19 11 28.1	35.94	16 12.61	14 48.82	0.521	03 48 14.62
20	15 37 35.27	10.411	19 25 40.2	35.07	16 12.82	14 35.91	0.555	03 52 11.17
21	15 41 45.54	10.445	-19 39 31.3	-34.18	16 13.02	+14 22.20	-0.588	03 56 07.73
22	15 45 56.61	10.478	19 53 00.9	33.28	16 13.22	14 07.68	0.621	04 00 04.29
23	15 50 08.48	10.511	20 06 08.8	32.37	16 13.41	13 52.37	0.654	04 04 00.85
24	15 54 21.13	10.543	20 18 54.5	31.44	16 13.60	13 36.28	0.687	04 07 57.41
25	15 58 34.56	10.576	20 31 17.8	30.50	16 13.79	13 19.41	0.719	04 11 53.96
26	16 02 48.76	10.608	-20 43 18.3	-29.54	16 13.97	+13 01.77	-0.751	04 15 50.52
27	16 07 03.71	10.639	20 54 55.8	28.57	16 14.15	12 43.37	0.782	04 19 47.08
28	16 11 19.41	10.670	21 06 09.8	27.59	16 14.32	12 24.22	0.813	04 23 43.64
29	16 15 35.85	10.700	21 17 00.1	26.60	16 14.48	12 04.34	0.843	04 27 40.20
30	16 19 53.01	10.730	21 27 26.3	25.59	16 14.64	11 43.74	0.873	04 31 36.75
Dec. 1	16 24 10.88	10.759	-21 37 28.2	-24.57	16 14.80	+11 22.44	-0.902	04 35 33.31
2	16 28 29.43	10.787	21 47 05.4	23.53	16 14.95	11 00.44	0.931	04 39 29.87
3	16 32 48.66	10.815	21 56 17.6	22.49	16 15.09	10 37.77	0.958	04 43 26.43
4	16 37 08.53	10.841	22 05 04.7	21.43	16 15.24	10 14.46	0.985	04 47 22.99
5	16 41 29.03	10.867	22 13 26.2	20.36	16 15.38	9 50.51	1.010	04 51 19.55
6	16 45 50.14	10.891	-22 21 21.9	-19.28	16 15.51	+ 9 25.97	-1.035	04 55 16.10
7	16 50 11.81	10.915	22 28 51.5	18.19	16 15.64	9 00.85	1.058	04 59 12.66
8	16 54 34.03	10.937	22 35 54.8	17.08	16 15.77	8 35.19	1.080	05 03 09.22
9	16 58 56.76	10.957	22 42 31.5	15.97	16 15.90	8 09.02	1.101	05 07 05.78
10	17 03 19.97	10.977	22 48 41.5	14.85	16 16.02	7 42.37	1.120	05 11 02.34
11	17 07 43.63	10.994	-22 54 24.4	-13.72	16 16.14	+ 7 15.27	-1.138	05 14 58.90
12	17 12 07.69	11.011	22 59 40.2	12.59	16 16.25	6 47.76	1.154	05 18 55.46
13	17 16 32.14	11.026	23 04 28.6	11.44	16 16.36	6 19.88	1.169	05 22 52.02
14	17 20 56.92	11.039	23 08 49.4	10.29	16 16.47	5 51.65	1.183	05 26 48.58
15	17 25 22.02	11.052	23 12 42.6	9.14	16 16.58	5 23.12	1.195	05 30 45.13
16	17 29 47.39	11.062	-23 16 08.1	-7.98	16 16.68	+ 4 54.31	-1.206	05 34 41.69
17	17 34 13.00	11.072	23 19 05.6	6.81	16 16.77	4 25.25	1.215	05 38 38.25
18	17 38 38.83	11.080	23 21 35.1	5.65	16 16.86	3 55.99	1.223	05 42 34.81
19	17 43 04.83	11.087	23 23 36.6	4.48	16 16.95	3 26.55	1.230	05 46 31.37
20	17 47 30.97	11.092	23 25 10.0	3.30	16 17.03	2 56.96	1.235	05 50 27.93
21	17 51 57.23	11.096	-23 26 15.2	-2.13	16 17.11	+ 2 27.26	-1.239	05 54 24.49
22	17 56 23.56	11.099	23 26 52.2	-0.95	16 17.18	1 57.49	1.242	05 58 21.05
23	18 00 49.95	11.100	23 27 01.0	+ 0.22	16 17.24	1 27.66	1.243	06 02 17.61
24	18 05 16.35	11.100	23 26 41.5	1.40	16 17.30	0 57.82	1.243	06 06 14.17
25	18 09 42.74	11.099	23 25 53.8	2.58	16 17.35	+ 0 27.99	1.242	06 10 10.73
26	18 14 09.09	11.096	-23 24 37.9	+ 3.75	16 17.39	- 0 01.80	-1.240	06 14 07.29
27	18 18 35.36	11.093	23 22 53.8	4.92	16 17.43	0 31.52	1.236	06 18 03.85
28	18 23 01.53	11.088	23 20 41.5	6.10	16 17.46	1 01.13	1.231	06 22 00.40
29	18 27 27.57	11.082	23 18 01.2	7.27	16 17.48	1 30.61	1.225	06 25 56.96
30	18 31 53.45	11.075	23 14 52.8	8.43	16 17.50	1 59.93	1.218	06 29 53.52
31	18 36 19.14	11.066	-23 11 16.5	+ 9.60	16 17.52	- 2 29.06	-1.209	06 33 50.08
32	18 40 44.61	11.056	-23 07 12.2	+10.75	16 17.53	- 2 57.97	-1.199	06 37 46.64

Date.	Mean Equinox of 1931.0.		Logarithm of Radius Vector of the Earth.	Prec. in Long.	Nut. in Long.	Nut. in R.A.	Transit of First Point of Aries.
	Longitude.	Latitude.					
Nov. 16	232° 39' 36".5 3628".8	-0°.43	9.995 1557	+43".86	-2".12	-0.112	20 20 14.60
17	233 40 05.3 3630.1	0.34	9.995 0580	43.99	2.09	.110	20 16 18.69
18	234 40 35.4 3631.3	0.23	9.994 9617	44.13	2.06	.111	20 12 22.77
19	235 41 06.7 3632.7	-0.11	9.994 8671	44.27	2.03	.114	20 08 26.86
20	236 41 39.4 3633.9	+0.02	9.994 7742	44.41	1.99	.119	20 04 30.95
21	237 42 13.3 3635.2	+0.15	9.994 6831	+44.54	-1.96	-0.123	20 00 35.04
22	238 42 48.5 3636.5	0.29	9.994 5940	44.68	1.92	.127	19 56 39.13
23	239 43 25.0 3637.8	0.41	9.994 5069	44.82	1.88	.129	19 52 43.22
24	240 44 02.8 3639.1	0.52	9.994 4219	44.96	1.84	.128	19 48 47.30
25	241 44 41.9 3640.5	0.60	9.994 3391	45.09	1.80	.125	19 44 51.39
26	242 45 22.4 3641.9	+0.68	9.994 2586	+45.23	-1.76	-0.119	19 40 55.48
27	243 46 04.3 3643.3	0.72	9.994 1804	45.37	1.71	.111	19 36 59.57
28	244 46 47.6 3644.7	0.72	9.994 1045	45.51	1.67	.102	19 33 03.66
29	245 47 32.3 3646.1	0.70	9.994 0308	45.64	1.62	.093	19 29 07.74
30	246 48 18.4 3647.6	0.65	9.993 9594	45.78	1.57	.086	19 25 11.83
Dec. 1	247 49 06.0 3649.1	+0.57	9.993 8902	+45.92	-1.52	-0.081	19 21 15.92
2	248 49 55.1 3650.6	0.48	9.993 8231	46.06	1.47	.080	19 17 20.01
3	249 50 45.7 3652.1	0.36	9.993 7579	46.19	1.42	.082	19 13 24.09
4	250 51 37.8 3653.4	0.23	9.993 6946	46.33	1.37	.086	19 09 28.18
5	251 52 31.2 3654.7	+0.10	9.993 6330	46.47	1.32	.089	19 05 32.27
6	252 53 25.9 3656.1	-0.02	9.993 5730	+46.61	-1.26	-0.090	19 01 36.36
7	253 54 22.0 3657.2	0.13	9.993 5145	46.75	1.21	.088	18 57 40.44
8	254 55 19.2 3658.3	0.22	9.993 4574	46.88	1.15	.083	18 53 44.53
9	255 56 17.5 3659.3	0.28	9.993 4016	47.02	1.09	.075	18 49 48.62
10	256 57 16.8 3660.1	0.31	9.993 3473	47.16	1.03	.064	18 45 52.70
11	257 58 16.9 3660.9	-0.31	9.993 2943	+47.30	-0.98	-0.052	18 41 56.79
12	258 59 17.8 3661.5	0.28	9.993 2427	47.43	0.92	.043	18 38 00.88
13	260 00 19.3 3662.1	0.22	9.993 1927	47.57	0.86	.035	18 34 04.97
14	261 01 21.4 3662.7	0.14	9.993 1444	47.71	0.80	.031	18 30 09.05
15	262 02 24.1 3663.1	-0.04	9.993 0979	47.85	0.73	.029	18 26 13.14
16	263 03 27.2 3663.6	+0.08	9.993 0533	+47.98	-0.67	-0.030	18 22 17.23
17	264 04 30.8 3663.9	0.20	9.993 0107	48.12	0.61	.032	18 18 21.31
18	265 05 34.7 3664.3	0.33	9.992 9703	48.26	0.55	.035	18 14 25.40
19	266 06 39.0 3664.6	0.45	9.992 9321	48.40	0.49	.038	18 10 29.49
20	267 07 43.6 3665.0	0.57	9.992 8963	48.53	0.42	.039	18 06 33.57
21	268 08 48.6 3665.3	+0.68	9.992 8630	+48.67	-0.36	-0.038	18 02 37.66
22	269 09 53.9 3665.6	0.77	9.992 8323	48.81	0.30	.034	17 58 41.75
23	270 10 59.5 3665.9	0.84	9.992 8042	48.95	0.24	.027	17 54 45.83
24	271 12 05.4 3666.2	0.88	9.992 7789	49.08	0.17	.019	17 50 49.92
25	272 13 11.6 3666.6	0.89	9.992 7564	49.22	0.11	-0.009	17 46 54.01
26	273 14 18.2 3667.0	+0.87	9.992 7367	+49.36	-0.05	+0.002	17 42 58.09
27	274 15 25.2 3667.4	0.82	9.992 7198	49.50	+0.02	.011	17 39 02.18
28	275 16 32.6 3667.9	0.75	9.992 7058	49.64	0.08	.017	17 35 06.27
29	276 17 40.5 3668.3	0.65	9.992 6945	49.77	0.14	.020	17 31 10.35
30	277 18 48.8 3668.7	0.52	9.992 6859	49.91	0.20	.020	17 27 14.44
31	278 19 57.5 3669.2	+0.38	9.992 6798	+50.05	+0.26	+0.018	17 23 18.53
32	279 21 06.7	+0.26	9.992 6762	+50.19	+0.33	+0.015	17 19 22.61

AT TRANSIT AT GREENWICH.

Date.	Day of Week.	Apparent Right Ascension.		Var. per hour of Long.	Apparent Declination.		Var. per hour of Long.	Semi-diameter in			
		h	m		s	°		'	"	Sidereal Time.	Arc.
Jan. 1	Th.	18	44	02.99	11.047	- 23	03	50.5	+ 11.63	1 11.05	16 17.55
2	F.	18	48	27.95	11.033	22	58	57.7	12.77	1 11.01	16 17.56
3	S.	18	52	52.58	11.019	22	53	37.4	13.92	1 10.96	16 17.56
4	S.	18	57	16.84	11.003	22	47	49.8	15.05	1 10.91	16 17.56
5	M.	19	01	40.70	10.986	22	41	35.1	16.18	1 10.85	16 17.55
6	Tu.	19	06	04.14	10.968	- 22	34	53.4	+ 17.30	1 10.80	16 17.53
7	W.	19	10	27.15	10.949	22	27	45.0	18.41	1 10.73	16 17.51
8	Th.	19	14	49.69	10.929	22	20	09.9	19.51	1 10.67	16 17.48
9	F.	19	19	11.75	10.909	22	12	08.6	20.60	1 10.60	16 17.44
10	S.	19	23	33.29	10.887	22	03	41.0	21.69	1 10.52	16 17.40
11	S.	19	27	54.31	10.864	- 21	54	47.6	+ 22.76	1 10.44	16 17.36
12	M.	19	32	14.76	10.840	21	45	28.5	23.83	1 10.36	16 17.30
13	Tu.	19	36	34.63	10.816	21	35	44.0	24.88	1 10.28	16 17.25
14	W.	19	40	53.90	10.790	21	25	34.3	25.92	1 10.19	16 17.19
15	Th.	19	45	12.54	10.763	21	14	59.8	26.95	1 10.10	16 17.12
16	F.	19	49	30.52	10.735	- 21	04	00.7	+ 27.97	1 10.01	16 17.06
17	S.	19	53	47.83	10.707	20	52	37.4	28.97	1 09.92	16 16.98
18	S.	19	58	04.44	10.677	20	40	50.1	29.96	1 09.82	16 16.91
19	M.	20	02	20.34	10.647	20	28	39.3	30.94	1 09.72	16 16.83
20	Tu.	20	06	35.50	10.616	20	16	05.3	31.90	1 09.62	16 16.74
21	W.	20	10	49.91	10.584	- 20	03	08.4	+ 32.84	1 09.52	16 16.66
22	Th.	20	15	03.55	10.552	19	49	49.0	33.77	1 09.41	16 16.57
23	F.	20	19	16.40	10.519	19	36	07.4	34.69	1 09.31	16 16.47
24	S.	20	23	28.47	10.486	19	22	04.1	35.59	1 09.20	16 16.37
25	S.	20	27	39.72	10.452	19	07	39.4	36.47	1 09.09	16 16.27
26	M.	20	31	50.16	10.418	- 18	52	53.8	+ 37.33	1 08.98	16 16.17
27	Tu.	20	35	59.78	10.384	18	37	47.5	38.18	1 08.87	16 16.05
28	W.	20	40	08.57	10.349	18	22	21.1	39.02	1 08.75	16 15.94
29	Th.	20	44	16.53	10.314	18	06	34.9	39.83	1 08.64	16 15.82
30	F.	20	48	23.65	10.279	17	50	29.2	40.63	1 08.53	16 15.69
31	S.	20	52	29.93	10.244	- 17	34	04.6	+ 41.42	1 08.41	16 15.56
Feb. 1	S.	20	56	35.38	10.210	17	17	21.4	42.18	1 08.30	16 15.42
2	M.	21	00	40.01	10.175	17	00	20.0	42.93	1 08.18	16 15.28
3	Tu.	21	04	43.80	10.141	16	43	00.7	43.67	1 08.07	16 15.13
4	W.	21	08	46.78	10.107	16	25	24.0	44.39	1 07.95	16 14.98
5	Th.	21	12	48.95	10.074	- 16	07	30.2	+ 45.09	1 07.84	16 14.82
6	F.	21	16	50.32	10.040	15	49	19.7	45.78	1 07.72	16 14.65
7	S.	21	20	50.89	10.008	15	30	52.9	46.45	1 07.61	16 14.48
8	S.	21	24	50.68	9.975	15	12	10.2	47.11	1 07.50	16 14.31
9	M.	21	28	49.69	9.943	14	53	12.0	47.74	1 07.38	16 14.13
10	Tu.	21	32	47.93	9.910	- 14	33	58.6	+ 48.36	1 07.27	16 13.94
11	W.	21	36	45.39	9.879	14	14	30.6	48.97	1 07.16	16 13.76
12	Th.	21	40	42.10	9.847	13	54	48.3	49.55	1 07.05	16 13.57
13	F.	21	44	38.06	9.816	13	34	52.1	50.12	1 06.94	16 13.37
14	S.	21	48	33.27	9.785	13	14	42.5	50.67	1 06.83	16 13.18
15	S.	21	52	27.74	9.754	- 12	54	20.0	+ 51.21	1 06.73	16 12.98
16	M.	21	56	21.48	9.724	- 12	33	44.8	+ 51.72	1 06.62	16 12.78

SUN, 1931.

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AT TRANSIT AT GREENWICH.

Date.	Day of Week.	Apparent Right Ascension.			Var. per hour of Long.	Apparent Declination.			Var. per hour of Long.	Semi-diameter in	
		h	m	s		°	'	"		Sidereal Time.	Arc.
Feb. 16	M.	21	56	21.48	9.724	- 12	33	44.8	+ 51.72	1 06.62	16 12.78
17	Tu.	22	00	14.49	9.694	12	12	57.5	52.22	1 06.52	16 12.57
18	W.	22	04	06.80	9.665	11	51	58.5	52.69	1 06.42	16 12.37
19	Th.	22	07	58.40	9.636	11	30	48.3	53.16	1 06.32	16 12.16
20	F.	22	11	49.32	9.607	11	09	27.2	53.60	1 06.22	16 11.95
21	S.	22	15	39.55	9.579	- 10	47	55.8	+ 54.02	1 06.13	16 11.74
22	S.	22	19	29.12	9.552	10	26	14.4	54.43	1 06.03	16 11.52
23	M.	22	23	18.03	9.525	10	04	23.4	54.81	1 05.94	16 11.31
24	Tu.	22	27	06.30	9.498	9	42	23.4	55.19	1 05.85	16 11.09
25	W.	22	30	53.95	9.472	9	20	14.7	55.54	1 05.77	16 10.87
26	Th.	22	34	40.98	9.447	- 8	57	57.7	+ 55.87	1 05.68	16 10.64
27	F.	22	38	27.42	9.423	8	35	32.9	56.19	1 05.60	16 10.42
28	S.	22	42	13.29	9.400	8	13	00.6	56.49	1 05.52	16 10.19
Mar. 1	S.	22	45	58.61	9.377	7	50	21.3	56.78	1 05.44	16 09.95
2	M.	22	49	43.38	9.355	7	27	35.3	57.05	1 05.37	16 09.72
3	Tu.	22	53	27.65	9.334	- 7	04	43.0	+ 57.31	1 05.30	16 09.48
4	W.	22	57	11.43	9.314	6	41	44.8	57.55	1 05.23	16 09.23
5	Th.	23	00	54.74	9.295	6	18	41.0	57.77	1 05.16	16 08.98
6	F.	23	04	37.61	9.277	5	55	31.9	57.98	1 05.10	16 08.73
7	S.	23	08	20.06	9.260	5	32	18.0	58.18	1 05.03	16 08.47
8	S.	23	12	02.11	9.244	- 5	08	59.5	+ 58.36	1 04.98	16 08.22
9	M.	23	15	43.79	9.229	4	45	36.8	58.53	1 04.92	16 07.95
10	Tu.	23	19	25.12	9.215	4	22	10.4	58.68	1 04.87	16 07.69
11	W.	23	23	06.12	9.202	3	58	40.5	58.81	1 04.82	16 07.42
12	Th.	23	26	46.80	9.189	3	35	07.5	58.93	1 04.77	16 07.16
13	F.	23	30	27.19	9.177	- 3	11	31.9	+ 59.03	1 04.72	16 06.89
14	S.	23	34	07.31	9.166	2	47	54.0	59.12	1 04.68	16 06.62
15	S.	23	37	47.16	9.156	2	24	14.2	59.19	1 04.64	16 06.35
16	M.	23	41	26.78	9.146	2	00	32.8	59.25	1 04.61	16 06.08
17	Tu.	23	45	06.18	9.137	1	36	50.4	59.29	1 04.58	16 05.81
18	W.	23	48	45.37	9.129	- 1	13	07.2	+ 59.31	1 04.55	16 05.54
19	Th.	23	52	24.38	9.122	0	49	23.7	59.32	1 04.52	16 05.26
20	F.	23	56	03.23	9.115	0	25	40.2	59.30	1 04.50	16 04.99
21	S.	23	59	41.92	9.109	- 0	01	57.2	59.28	1 04.48	16 04.72
22	S.	00	03	20.48	9.104	+ 0	21	45.0	59.24	1 04.46	16 04.45
23	M.	00	06	58.92	9.100	+ 0	45	26.1	+ 59.18	1 04.45	16 04.18
24	Tu.	00	10	37.27	9.096	1	09	05.5	59.10	1 04.44	16 03.91
25	W.	00	14	15.54	9.093	1	32	42.9	59.01	1 04.43	16 03.64
26	Th.	00	17	53.76	9.091	1	56	18.0	58.91	1 04.42	16 03.37
27	F.	00	21	31.93	9.090	2	19	50.4	58.79	1 04.42	16 03.11
28	S.	00	25	10.07	9.089	+ 2	43	19.7	+ 58.65	1 04.42	16 02.84
29	S.	00	28	48.22	9.090	3	06	45.6	58.50	1 04.43	16 02.56
30	M.	00	32	26.39	9.091	3	30	07.8	58.34	1 04.44	16 02.29
31	Tu.	00	36	04.60	9.093	3	53	25.8	58.16	1 04.45	16 02.02
Apr. 1	W.	00	39	42.87	9.096	4	16	39.5	57.97	1 04.46	16 01.75
2	Th.	00	43	21.23	9.101	+ 4	39	48.4	+ 57.77	1 04.47	16 01.47
3	F.	00	46	59.71	9.106	+ 5	02	52.3	+ 57.55	1 04.49	16 01.19

AT TRANSIT AT GREENWICH.

Date.	Day of Week.	Apparent Right Ascension.	Var. per hour of Long.	Apparent Declination.	Var. per hour of Long.	Semi-diameter in	
						Sidereal Time.	Arc.
Apr.	1 W.	^h 00 ^m 39 ^s 42.87	^s 9.096	[°] + 4 ['] 16 ["] 39.5	["] + 57.97	^m 1 04.46	['] 16 01.75
	2 Th.	00 43 21.23	9.101	4 39 48.4	57.77	1 04.47	16 01.47
	3 F.	00 46 59.71	9.106	5 02 52.3	57.55	1 04.49	16 01.19
	4 S.	00 50 38.32	9.112	5 25 50.9	57.32	1 04.51	16 00.91
	5 S.	00 54 17.09	9.119	5 48 43.8	57.08	1 04.54	16 00.64
	6 M.	00 57 56.04	9.127	+ 6 11 30.7	+ 56.83	1 04.56	16 00.36
	7 Tu.	01 01 35.20	9.136	6 34 11.4	56.56	1 04.59	16 00.08
	8 W.	01 05 14.58	9.146	6 56 45.5	56.28	1 04.62	15 59.79
	9 Th.	01 08 54.20	9.156	7 19 12.6	55.98	1 04.66	15 59.51
	10 F.	01 12 34.08	9.167	7 41 32.5	55.67	1 04.69	15 59.24
	11 S.	01 16 14.24	9.179	+ 8 03 44.7	+ 55.35	1 04.73	15 58.96
	12 S.	01 19 54.68	9.192	8 25 48.9	55.01	1 04.78	15 58.68
	13 M.	01 23 35.44	9.205	8 47 44.8	54.65	1 04.82	15 58.40
	14 Tu.	01 27 16.52	9.219	9 09 32.0	54.28	1 04.87	15 58.13
	15 W.	01 30 57.94	9.233	9 31 10.2	53.90	1 04.92	15 57.86
	16 Th.	01 34 39.71	9.248	+ 9 52 39.0	+ 53.50	1 04.97	15 57.59
	17 F.	01 38 21.84	9.263	10 13 58.0	53.08	1 05.02	15 57.32
	18 S.	01 42 04.35	9.279	10 35 06.8	52.65	1 05.08	15 57.06
	19 S.	01 45 47.24	9.295	10 56 05.3	52.21	1 05.13	15 56.80
	20 M.	01 49 30.53	9.312	11 16 52.8	51.75	1 05.19	15 56.54
	21 Tu.	01 53 14.24	9.330	+ 11 37 29.2	+ 51.28	1 05.26	15 56.28
	22 W.	01 56 58.36	9.347	11 57 54.1	50.79	1 05.32	15 56.03
	23 Th.	02 00 42.90	9.365	12 18 07.0	50.29	1 05.39	15 55.78
	24 F.	02 04 27.89	9.384	12 38 07.7	49.77	1 05.45	15 55.53
	25 S.	02 08 13.32	9.403	12 57 55.9	49.24	1 05.52	15 55.28
	26 S.	02 11 59.21	9.422	+ 13 17 31.1	+ 48.70	1 05.59	15 55.03
	27 M.	02 15 45.57	9.442	13 36 53.2	48.14	1 05.67	15 54.79
	28 Tu.	02 19 32.41	9.462	13 56 01.7	47.57	1 05.74	15 54.55
	29 W.	02 23 19.74	9.483	14 14 56.4	46.99	1 05.81	15 54.31
	30 Th.	02 27 07.58	9.504	14 33 37.0	46.39	1 05.89	15 54.07
May	1 F.	02 30 55.94	9.526	+ 14 52 03.1	+ 45.79	1 05.97	15 53.83
	2 S.	02 34 44.82	9.548	15 10 14.6	45.17	1 06.04	15 53.59
	3 S.	02 38 34.24	9.571	15 28 11.1	44.54	1 06.12	15 53.35
	4 M.	02 42 24.22	9.594	15 45 52.3	43.90	1 06.20	15 53.12
	5 Tu.	02 46 14.76	9.618	16 03 18.0	43.24	1 06.28	15 52.88
	6 W.	02 50 05.87	9.642	+ 16 20 27.8	+ 42.58	1 06.36	15 52.65
	7 Th.	02 53 57.56	9.666	16 37 21.5	41.90	1 06.44	15 52.42
	8 F.	02 57 49.84	9.690	16 53 58.7	41.20	1 06.52	15 52.19
	9 S.	03 01 42.70	9.715	17 10 19.1	40.50	1 06.61	15 51.96
	10 S.	03 05 36.15	9.740	17 26 22.5	39.78	1 06.69	15 51.74
	11 M.	03 09 30.20	9.764	+ 17 42 08.5	+ 39.05	1 06.77	15 51.52
	12 Tu.	03 13 24.84	9.789	17 57 36.8	38.31	1 06.85	15 51.30
	13 W.	03 17 20.07	9.814	18 12 47.1	37.55	1 06.93	15 51.09
	14 Th.	03 21 15.88	9.838	18 27 39.2	36.78	1 07.01	15 50.88
	15 F.	03 25 12.29	9.862	18 42 12.6	36.00	1 07.10	15 50.67
	16 S.	03 29 09.27	9.886	+ 18 56 27.1	+ 35.21	1 07.18	15 50.47
	17 S.	03 33 06.83	9.910	+ 19 10 22.4	+ 34.40	1 07.26	15 50.27

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AT TRANSIT AT GREENWICH.

Date.	Day of Week.	Apparent Right Ascension.	Var. per hour of Long.	Apparent Declination.	Var. per hour of Long.	Semi-diameter in	
						Sidereal Time.	Arc.
May	17	h m s 03 33 06.83	s 9.910	° ' " +19 10 22.4	" + 34.40	m s 1 07.26	' " 15 50.27
	18	03 37 04.96	9.934	19 23 58.2	33.58	1 07.34	15 50.08
	19	03 41 03.64	9.957	19 37 14.3	32.75	1 07.42	15 49.90
	20	03 45 02.87	9.979	19 50 10.3	31.91	1 07.49	15 49.71
	21	03 49 02.64	10.002	20 02 46.0	31.06	1 07.57	15 49.53
	22	03 53 02.94	10.023	+20 15 01.0	+ 30.20	1 07.65	15 49.36
	23	03 57 03.76	10.045	20 26 55.3	29.32	1 07.72	15 49.19
	24	04 01 03.08	10.066	20 38 28.4	28.44	1 07.80	15 49.02
	25	04 05 06.90	10.086	20 49 40.2	27.54	1 07.87	15 48.86
	26	04 09 09.20	10.106	21 00 30.4	26.64	1 07.94	15 48.70
	27	04 13 11.98	10.125	+21 10 58.9	+ 25.73	1 08.01	15 48.54
	28	04 17 15.22	10.145	21 21 05.5	24.81	1 08.08	15 48.39
	29	04 21 18.92	10.163	21 30 49.8	23.89	1 08.14	15 48.24
	30	04 25 23.06	10.182	21 40 11.9	22.95	1 08.20	15 48.09
	31	04 29 27.65	10.200	21 49 11.5	22.01	1 08.26	15 47.94
June	1	04 33 32.65	10.217	+21 57 48.3	+ 21.06	1 08.32	15 47.80
	2	04 37 38.08	10.235	22 06 02.3	20.10	1 08.38	15 47.66
	3	04 41 43.91	10.251	22 13 53.3	19.14	1 08.43	15 47.52
	4	04 45 50.13	10.267	22 21 21.0	18.17	1 08.49	15 47.38
	5	04 49 56.73	10.283	22 28 25.4	17.19	1 08.54	15 47.25
	6	04 54 03.69	10.297	+22 35 06.3	+ 16.21	1 08.58	15 47.12
	7	04 58 10.99	10.311	22 41 23.5	15.22	1 08.63	15 47.00
	8	05 02 18.62	10.324	22 47 16.9	14.23	1 08.67	15 46.88
	9	05 06 26.55	10.337	22 52 46.3	13.23	1 08.70	15 46.76
	10	05 10 34.77	10.348	22 57 51.6	12.22	1 08.74	15 46.65
	11	05 14 43.24	10.358	+23 02 32.8	+ 11.21	1 08.77	15 46.54
	12	05 18 51.96	10.368	23 06 49.5	10.19	1 08.80	15 46.44
	13	05 23 00.89	10.376	23 10 41.9	9.17	1 08.83	15 46.34
	14	05 27 10.01	10.384	23 14 09.8	8.15	1 08.85	15 46.25
	15	05 31 19.30	10.390	23 17 13.0	7.12	1 08.87	15 46.16
	16	05 35 28.72	10.395	+23 19 51.5	+ 6.09	1 08.89	15 46.08
	17	05 39 38.25	10.399	23 22 05.3	5.06	1 08.90	15 46.00
	18	05 43 47.86	10.402	23 23 54.3	4.03	1 08.91	15 45.93
	19	05 47 57.53	10.403	23 25 18.5	2.99	1 08.92	15 45.86
	20	05 52 07.22	10.404	23 26 17.9	1.95	1 08.92	15 45.80
	21	05 56 16.90	10.403	+23 26 52.3	+ 0.92	1 08.92	15 45.75
	22	06 00 26.56	10.401	23 27 02.0	- 0.12	1 08.92	15 45.70
	23	06 04 36.16	10.399	23 26 46.8	1.15	1 08.92	15 45.65
	24	06 08 45.69	10.395	23 26 06.8	2.18	1 08.91	15 45.61
	25	06 12 55.11	10.390	23 25 02.1	3.21	1 08.89	15 45.57
	26	06 17 04.41	10.385	+23 23 32.6	- 4.24	1 08.88	15 45.54
	27	06 21 13.57	10.379	23 21 38.5	5.27	1 08.86	15 45.51
	28	06 25 22.57	10.371	23 19 19.8	6.29	1 08.84	15 45.48
	29	06 29 31.40	10.364	23 16 36.6	7.31	1 08.81	15 45.46
	30	06 33 40.02	10.355	23 13 28.9	8.33	1 08.78	15 45.44
July	1	06 37 48.43	10.346	+23 09 56.9	- 9.34	1 08.75	15 45.42
	2	06 41 56.61	10.336	+23 06 00.5	- 10.35	1 08.72	15 45.40

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AT TRANSIT AT GREENWICH.

Date.	Day of Week.	Apparent Right Ascension.	Var. per hour of Long.	Apparent Declination.	Var. per hour of Long.	Semi-diameter in	
						Sidereal Time.	Arc.
July	1 W.	^h 06 ^m 37 ^s 48.43	^s 10.346	[°] +23 ['] 09 ["] 56.9	["] - 9.34	^m 1 08.75	['] 15 45.42
	2 Th.	06 41 56.61	10.336	23 06 00.5	10.35	1 08.72	15 45.40
	3 F.	06 46 04.53	10.325	23 01 40.0	11.36	1 08.68	15 45.39
	4 S.	06 50 12.19	10.313	22 56 55.3	12.36	1 08.64	15 45.39
	5 S.	06 54 19.56	10.301	22 51 46.7	13.36	1 08.60	15 45.38
	6 M.	06 58 26.62	10.288	+22 46 14.1	- 14.35	1 08.55	15 45.38
	7 Tu.	07 02 33.36	10.274	22 40 17.8	15.34	1 08.50	15 45.39
	8 W.	07 06 39.75	10.259	22 33 57.9	16.32	1 08.45	15 45.40
	9 Th.	07 10 45.79	10.244	22 27 14.6	17.29	1 08.39	15 45.41
	10 F.	07 14 51.44	10.227	22 20 07.8	18.26	1 08.33	15 45.43
	11 S.	07 18 56.69	10.210	+22 12 38.0	- 19.23	1 08.27	15 45.45
	12 S.	07 23 01.52	10.192	22 04 45.1	20.18	1 08.21	15 45.48
	13 M.	07 27 05.92	10.174	21 56 29.4	21.13	1 08.15	15 45.51
	14 Tu.	07 31 09.86	10.154	21 47 51.0	22.07	1 08.08	15 45.55
	15 W.	07 35 13.33	10.134	21 38 50.3	23.00	1 08.01	15 45.60
	16 Th.	07 39 16.30	10.113	+21 29 27.3	- 23.92	1 07.94	15 45.65
	17 F.	07 43 18.76	10.092	21 19 42.4	24.83	1 07.87	15 45.70
	18 S.	07 47 20.69	10.069	21 09 35.7	25.73	1 07.80	15 45.76
	19 S.	07 51 22.08	10.046	20 59 07.5	26.62	1 07.72	15 45.83
	20 M.	07 55 22.90	10.023	20 48 18.1	27.50	1 07.65	15 45.91
	21 Tu.	07 59 23.16	9.999	+20 37 07.6	- 28.37	1 07.57	15 45.99
	22 W.	08 03 22.83	9.974	20 25 36.5	29.23	1 07.49	15 46.07
	23 Th.	08 07 21.92	9.949	20 13 44.8	30.08	1 07.41	15 46.15
	24 F.	08 11 20.40	9.924	20 01 33.0	30.91	1 07.33	15 46.24
	25 S.	08 15 18.29	9.899	19 49 01.1	31.74	1 07.24	15 46.34
	26 S.	08 19 15.58	9.874	+19 36 09.6	- 32.55	1 07.16	15 46.43
	27 M.	08 23 12.26	9.849	19 22 58.6	33.36	1 07.08	15 46.53
	28 Tu.	08 27 08.33	9.824	19 09 28.5	34.15	1 06.99	15 46.64
	29 W.	08 31 03.80	9.799	18 55 39.4	34.94	1 06.91	15 46.74
	30 Th.	08 34 58.67	9.774	18 41 31.6	35.71	1 06.82	15 46.85
Aug.	31 F.	08 38 52.93	9.749	+18 27 05.4	- 36.47	1 06.73	15 46.97
	1 S.	08 42 46.60	9.724	18 12 21.1	37.22	1 06.65	15 47.08
	2 S.	08 46 39.66	9.699	17 57 18.9	37.96	1 06.56	15 47.20
	3 M.	08 50 32.14	9.674	17 41 59.1	38.69	1 06.47	15 47.32
	4 Tu.	08 54 24.02	9.649	17 26 22.0	39.40	1 06.38	15 47.44
	5 W.	08 58 15.31	9.625	+17 10 27.8	- 40.11	1 06.30	15 47.57
	6 Th.	09 02 06.02	9.601	16 54 16.8	40.80	1 06.21	15 47.70
	7 F.	09 05 56.14	9.577	16 37 49.4	41.48	1 06.12	15 47.84
	8 S.	09 09 45.69	9.553	16 21 05.7	42.15	1 06.04	15 47.98
	9 S.	09 13 34.67	9.529	16 04 06.2	42.81	1 05.95	15 48.12
	10 M.	09 17 23.07	9.505	+15 46 51.1	- 43.45	1 05.87	15 48.27
	11 Tu.	09 21 10.91	9.482	15 29 20.7	44.08	1 05.78	15 48.42
	12 W.	09 24 58.19	9.458	15 11 35.3	44.70	1 05.70	15 48.58
	13 Th.	09 28 44.91	9.435	14 53 35.3	45.30	1 05.62	15 48.75
	14 F.	09 32 31.07	9.412	14 35 21.0	45.89	1 05.54	15 48.92
	15 S.	09 36 16.68	9.389	+14 16 52.7	- 46.46	1 05.46	15 49.09
	16 S.	09 40 01.74	9.366	+13 58 10.8	- 47.02	1 05.38	15 49.26

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AT TRANSIT AT GREENWICH.

Date.	Day of Week.	Apparent Right Ascension.	Var. per hour of Long.	Apparent Declination.	Var. per hour of Long.	Semi-diameter in	
						Sidereal Time.	Arc.
Aug. 16	S.	^h 09 ^m 40 ^s 01.74	^s 9.366	[°] +13 ['] 58 ["] 10.8	["] -47.02	^m 1 05.38	['] 15 49.26
17	M.	09 43 46.26	9.344	13 39 15.7	47.57	1 05.31	15 49.45
18	Tu.	09 47 30.25	9.322	13 20 07.6	48.10	1 05.23	15 49.63
19	W.	09 51 13.71	9.300	13 00 46.9	48.62	1 05.16	15 49.82
20	Th.	09 54 56.65	9.279	12 41 14.0	49.12	1 05.09	15 50.02
21	F.	09 58 39.08	9.258	+12 21 29.2	-49.61	1 05.02	15 50.22
22	S.	10 02 21.03	9.238	12 01 32.8	50.09	1 04.95	15 50.42
23	S.	10 06 02.50	9.218	11 41 25.0	50.55	1 04.88	15 50.62
24	M.	10 09 43.51	9.199	11 21 06.3	51.01	1 04.82	15 50.83
25	Tu.	10 13 24.07	9.181	11 00 36.9	51.44	1 04.76	15 51.04
26	W.	10 17 04.21	9.164	+10 39 57.1	-51.87	1 04.70	15 51.25
27	Th.	10 20 43.94	9.147	10 19 07.2	52.29	1 04.64	15 51.46
28	F.	10 24 23.27	9.131	9 58 07.5	52.69	1 04.58	15 51.67
29	S.	10 28 02.24	9.116	9 36 58.4	53.08	1 04.53	15 51.89
30	S.	10 31 40.85	9.102	9 15 40.0	53.45	1 04.47	15 52.10
31	M.	10 35 19.13	9.088	+ 8 54 12.7	-53.82	1 04.42	15 52.32
Sept. 1	Tu.	10 38 57.08	9.075	8 32 36.8	54.17	1 04.38	15 52.54
2	W.	10 42 34.74	9.063	8 10 52.7	54.51	1 04.33	15 52.76
3	Th.	10 46 12.12	9.052	7 49 00.5	54.83	1 04.29	15 52.99
4	F.	10 49 49.24	9.041	7 27 00.7	55.15	1 04.25	15 53.22
5	S.	10 53 26.12	9.032	+ 7 04 53.5	-55.45	1 04.21	15 53.45
6	S.	10 57 02.77	9.023	6 42 39.3	55.74	1 04.18	15 53.68
7	M.	11 00 39.22	9.014	6 20 18.3	56.01	1 04.15	15 53.91
8	Tu.	11 04 15.47	9.007	5 57 50.9	56.27	1 04.12	15 54.15
9	W.	11 07 51.56	9.000	5 35 17.4	56.52	1 04.09	15 54.39
10	Th.	11 11 27.49	8.994	+ 5 12 38.2	-56.75	1 04.07	15 54.63
11	F.	11 15 03.28	8.988	4 49 53.6	56.96	1 04.05	15 54.87
12	S.	11 18 38.94	8.983	4 27 04.0	57.17	1 04.03	15 55.12
13	S.	11 22 14.49	8.979	4 04 09.8	57.35	1 04.01	15 55.38
14	M.	11 25 49.94	8.975	3 41 11.3	57.52	1 04.00	15 55.64
15	Tu.	11 29 25.31	8.972	+ 3 18 08.9	-57.68	1 03.99	15 55.90
16	W.	11 33 00.61	8.970	2 55 02.9	57.82	1 03.99	15 56.16
17	Th.	11 36 35.87	8.968	2 31 53.8	57.94	1 03.98	15 56.42
18	F.	11 40 11.10	8.968	2 08 41.8	58.05	1 03.98	15 56.69
19	S.	11 43 46.32	8.968	1 45 27.3	58.15	1 03.99	15 56.96
20	S.	11 47 21.55	8.969	+ 1 22 10.6	-58.23	1 03.99	15 57.23
21	M.	11 50 56.82	8.970	0 58 52.2	58.30	1 04.00	15 57.50
22	Tu.	11 54 32.14	8.973	0 35 32.1	58.36	1 04.01	15 57.77
23	W.	11 58 07.54	8.977	+ 0 12 10.9	58.41	1 04.03	15 58.04
24	Th.	12 01 43.04	8.982	- 0 11 11.2	58.44	1 04.05	15 58.32
25	F.	12 05 18.67	8.987	- 0 34 33.9	-58.45	1 04.07	15 58.59
26	S.	12 08 54.44	8.994	0 57 56.8	58.46	1 04.09	15 58.86
27	S.	12 12 30.39	9.002	1 21 19.7	58.45	1 04.12	15 59.13
28	M.	12 16 06.53	9.010	1 44 42.2	58.42	1 04.15	15 59.40
29	Tu.	12 19 42.89	9.020	2 08 03.9	58.39	1 04.18	15 59.67
30	W.	12 23 19.49	9.030	- 2 31 24.7	-58.34	1 04.22	15 59.94
Oct. 1	Th.	12 26 56.35	9.042	- 2 54 44.0	-58.27	1 04.26	16 00.21

AT TRANSIT AT GREENWICH.

Date.	Day of Week.	Apparent Right Ascension.	Var. per hour of Long.	Apparent Declination.	Var. per hour of Long.	Semi-diameter in		
						Sidereal Time.	Arc.	
Oct.	1	Th.	^h 12 ^m 26 ^s 56.35	9.042	— 2 54 44.0	— 58.27	^m 1 04.26	16 00.21
	2	F.	12 30 33.50	9.054	3 18 01.7	58.20	1 04.30	16 00.48
	3	S.	12 34 10.96	9.068	3 41 17.3	58.10	1 04.34	16 00.75
	4	sa.	12 37 48.75	9.082	4 04 30.6	58.00	1 04.39	16 01.02
	5	M.	12 41 26.90	9.097	4 27 41.1	57.88	1 04.44	16 01.29
	6	Tu.	12 45 05.41	9.113	— 4 50 48.6	— 57.74	1 04.50	16 01.57
	7	W.	12 48 44.32	9.130	5 13 52.6	57.59	1 04.55	16 01.84
	8	Th.	12 52 23.65	9.147	5 36 52.7	57.42	1 04.61	16 02.11
	9	F.	12 56 03.40	9.165	5 59 48.7	57.24	1 04.68	16 02.38
	10	S.	12 59 43.59	9.184	6 22 40.0	57.04	1 04.74	16 02.66
	11	sa.	13 03 24.25	9.204	— 6 45 26.3	— 56.82	1 04.81	16 02.93
	12	M.	13 07 05.38	9.224	7 08 07.2	56.58	1 04.88	16 03.21
	13	Tu.	13 10 47.00	9.245	7 30 42.3	56.33	1 04.96	16 03.49
	14	W.	13 14 29.13	9.266	7 53 11.0	56.06	1 05.03	16 03.76
	15	Th.	13 18 11.77	9.288	8 15 33.2	55.78	1 05.11	16 04.04
	16	F.	13 21 54.94	9.310	— 8 37 48.2	— 55.48	1 05.19	16 04.32
	17	S.	13 25 38.66	9.333	8 59 55.8	55.16	1 05.28	16 04.60
	18	sa.	13 29 22.95	9.357	9 21 55.6	54.82	1 05.36	16 04.88
	19	M.	13 33 07.83	9.382	9 43 47.2	54.47	1 05.45	16 05.16
	20	Tu.	13 36 53.30	9.408	10 05 30.1	54.11	1 05.55	16 05.44
	21	W.	13 40 39.39	9.434	— 10 27 04.1	— 53.72	1 05.64	16 05.71
	22	Th.	13 44 26.12	9.461	10 48 28.8	53.33	1 05.73	16 05.99
	23	F.	13 48 13.51	9.488	11 09 43.8	52.92	1 05.83	16 06.26
	24	S.	13 52 01.56	9.517	11 30 48.6	52.49	1 05.93	16 06.53
	25	sa.	13 55 50.31	9.546	11 51 43.0	52.04	1 06.03	16 06.79
	26	M.	13 59 39.76	9.575	— 12 12 26.6	— 51.58	1 06.14	16 07.06
	27	Tu.	14 03 29.94	9.606	12 32 59.0	51.11	1 06.24	16 07.32
	28	W.	14 07 20.85	9.637	12 53 19.7	50.62	1 06.35	16 07.58
	29	Th.	14 11 12.52	9.669	13 13 28.5	50.11	1 06.46	16 07.83
	30	F.	14 15 04.96	9.701	13 33 24.9	49.59	1 06.57	16 08.08
Nov.	31	S.	14 18 58.19	9.734	— 13 53 08.6	— 49.05	1 06.68	16 08.33
	1	sa.	14 22 52.21	9.768	14 12 39.2	48.49	1 06.79	16 08.58
	2	M.	14 26 47.04	9.802	14 31 56.2	47.92	1 06.90	16 08.83
	3	Tu.	14 30 42.70	9.836	14 50 59.2	47.33	1 07.02	16 09.07
	4	W.	14 34 39.19	9.871	15 09 48.0	46.73	1 07.13	16 09.31
	5	Th.	14 38 36.52	9.906	— 15 28 21.9	— 46.10	1 07.25	16 09.55
	6	F.	14 42 34.69	9.942	15 46 40.7	45.46	1 07.37	16 09.78
	7	S.	14 46 33.72	9.977	16 04 43.9	44.80	1 07.49	16 10.02
	8	sa.	14 50 33.60	10.013	16 22 31.0	44.12	1 07.61	16 10.25
	9	M.	14 54 34.33	10.048	16 40 01.6	43.43	1 07.73	16 10.48
	10	Tu.	14 58 35.90	10.084	— 16 57 15.3	— 42.71	1 07.84	16 10.72
	11	W.	15 02 38.33	10.119	17 14 11.6	41.98	1 07.96	16 10.95
	12	Th.	15 06 41.61	10.154	17 30 50.1	41.23	1 08.08	16 11.18
	13	F.	15 10 45.72	10.189	17 47 10.5	40.46	1 08.20	16 11.40
	14	S.	15 14 50.68	10.224	18 03 12.2	39.68	1 08.32	16 11.63
	15	sa.	15 18 56.46	10.259	— 18 18 54.9	— 38.88	1 08.44	16 11.85
16	M.	15 23 03.08	10.293	— 18 34 18.3	— 38.06	1 08.56	16 12.07	

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AT TRANSIT AT GREENWICH.

Date.	Day of Week.	Apparent Right Ascension.			Var. per hour of Long.	Apparent Declination.	Var. per hour of Long.	Semi-diameter in	
		h	m	s				Sidereal Time.	Arc.
Nov. 16	M.	15	23	03.08	10.293	-18 34 18.3	-38.06	1 08.56	16 12.07
17	Tu.	15	27	10.53	10.327	18 49 21.8	37.23	1 08.68	16 12.29
18	W.	15	31	18.80	10.362	19 04 05.2	36.38	1 08.80	16 12.50
19	Th.	15	35	27.88	10.396	19 18 28.0	35.52	1 08.91	16 12.71
20	F.	15	39	37.78	10.429	19 32 30.0	34.64	1 09.03	16 12.92
21	S.	15	43	48.49	10.463	-19 46 10.8	-33.75	1 09.14	16 13.12
22	S.	15	47	59.99	10.496	19 59 29.9	32.84	1 09.25	16 13.32
23	M.	15	52	12.29	10.529	20 12 27.1	31.92	1 09.36	16 13.51
24	Tu.	15	56	25.38	10.561	20 25 02.0	30.99	1 09.47	16 13.70
25	W.	16	00	39.23	10.593	20 37 14.4	30.04	1 09.57	16 13.88
26	Th.	16	04	53.86	10.625	-20 49 03.7	-29.07	1 09.68	16 14.06
27	F.	16	09	09.24	10.656	21 00 29.8	28.10	1 09.78	16 14.23
28	S.	16	13	25.36	10.687	21 11 32.4	27.11	1 09.88	16 14.40
29	S.	16	17	42.22	10.717	21 22 11.0	26.11	1 09.98	16 14.56
30	M.	16	21	59.79	10.747	21 32 25.4	25.09	1 10.07	16 14.72
Dec. 1	Tu.	16	26	18.06	10.776	-21 42 15.4	-24.07	1 10.16	16 14.87
2	W.	16	30	37.01	10.804	21 51 40.5	23.03	1 10.25	16 15.02
3	Th.	16	34	56.63	10.831	22 00 40.5	21.97	1 10.33	16 15.17
4	F.	16	39	16.89	10.857	22 09 15.1	20.91	1 10.41	16 15.31
5	S.	16	43	37.76	10.882	22 17 24.1	19.83	1 10.49	16 15.44
6	S.	16	47	59.23	10.906	-22 25 07.1	-18.75	1 10.57	16 15.58
7	M.	16	52	21.25	10.929	22 32 23.9	17.65	1 10.64	16 15.71
8	Tu.	16	56	43.81	10.950	22 39 14.2	16.54	1 10.71	16 15.83
9	W.	17	01	06.86	10.970	22 45 37.8	15.43	1 10.77	16 15.96
10	Th.	17	05	30.38	10.989	22 51 34.5	14.30	1 10.83	16 16.08
11	F.	17	09	54.32	11.006	-22 57 04.2	-13.17	1 10.89	16 16.19
12	S.	17	14	18.67	11.022	23 02 06.5	12.03	1 10.94	16 16.31
13	S.	17	18	43.37	11.036	23 06 41.3	10.88	1 10.99	16 16.42
14	M.	17	23	08.40	11.049	23 10 48.6	9.73	1 11.04	16 16.53
15	Tu.	17	27	33.72	11.061	23 14 28.1	8.57	1 11.08	16 16.63
16	W.	17	31	59.31	11.071	-23 17 39.7	-7.40	1 11.11	16 16.73
17	Th.	17	36	25.12	11.080	23 20 23.4	6.24	1 11.14	16 16.82
18	F.	17	40	51.12	11.087	23 22 39.1	5.07	1 11.17	16 16.91
19	S.	17	45	17.29	11.093	23 24 26.6	3.89	1 11.19	16 16.99
20	S.	17	49	43.59	11.098	23 25 46.0	2.72	1 11.21	16 17.07
21	M.	17	54	09.98	11.101	-23 26 37.2	-1.54	1 11.22	16 17.14
22	Tu.	17	58	36.44	11.103	23 27 00.1	-0.37	1 11.23	16 17.21
23	W.	18	03	02.93	11.104	23 26 54.8	+0.81	1 11.23	16 17.27
24	Th.	18	07	29.42	11.103	23 26 21.2	1.99	1 11.23	16 17.32
25	F.	18	11	55.88	11.102	23 25 19.4	3.16	1 11.23	16 17.37
26	S.	18	16	22.29	11.099	-23 23 49.3	+4.34	1 11.22	16 17.41
27	S.	18	20	48.60	11.094	23 21 51.1	5.51	1 11.20	16 17.44
28	M.	18	25	14.81	11.089	23 19 24.7	6.68	1 11.18	16 17.47
29	Tu.	18	29	40.86	11.082	23 16 30.3	7.85	1 11.16	16 17.50
30	W.	18	34	06.74	11.074	23 13 07.8	9.02	1 11.13	16 17.51
31	Th.	18	38	32.41	11.065	-23 09 17.4	+10.18	1 11.10	16 17.52
32	F.	18	42	57.84	11.054	-23 04 59.1	+11.34	1 11.06	16 17.53

Date.		MEAN EQUINOX OF 1931-0.					
		X		Y		Z	
Jan.	1	+0.1642796	-521	-0.8893842	+2755	-0.3857578	+1194
	2	+172117 1814913	571	+28318 8865524	2746	+12288 3845290	+1189
	3	171546 1986459	622	31064 8834460	2736	13477 3831813	+1186
	4	170924 2157383	669	33800 8800660	2724	14663 3817150	+1180
	5	170255 2327638	718	36524 8764136	2713	15843 3801307	+1175
	6	169537 +0.2497175	-768	39237 -0.8724899	+2701	17018 -0.3784289	+1170
	7	+168769 2665944	815	+41938 8682961	2693	+18188 3766101	+1167
	8	167954 2833898	866	44631 8638330	2682	19355 3746746	+1161
	9	167088 3000986	917	47313 8591017	2671	20516 3726230	+1158
	10	166171 3167157	967	49984 8541033	2658	21674 3704556	+1152
	11	165204 +0.3332361	-1020	52642 -0.8488391	+2645	22826 -0.3681730	+1147
	12	+164184 3496545	1073	+55287 8433104	2632	+23973 3657757	+1142
	13	163111 3659656	1127	57919 8375185	2614	25115 3632642	+1136
	14	161984 3821640	1179	60533 8314652	2598	26251 3606391	+1127
	15	160805 3982445	1232	63131 8251521	2580	27378 3579013	+1119
	16	159573 +0.4142018	-1286	65711 -0.8185810	+2558	28497 -0.3550516	+1112
	17	+158287 4300305	1339	+68269 8117541	2536	+29609 3520907	+1101
	18	156948 4457253	1389	70805 8046736	2513	30710 3490197	+1092
	19	155559 4612812	1440	73318 7973418	2488	31802 3458395	+1080
	20	154119 4766931	1490	75806 7897612	2463	32882 3425513	+1069
	21	152629 +0.4919560	-1541	78269 -0.7819343	+2434	33951 -0.3391562	+1058
	22	+151088 5070648	1587	+80703 7738640	2408	+35009 3356553	+1045
	23	149501 5220149	1633	83111 7655529	2378	36054 3320499	+1032
	24	147868 5368017	1681	85489 7570040	2347	37086 3283413	+1019
	25	146187 5514204	1724	87836 7482204	2319	38105 3245308	+1005
	26	144463 +0.5658667	-1769	90155 -0.7392049	+2287	39110 -0.3206198	+991
	27	+142694 5801361	1811	+92442 7299607	2253	+40101 3166097	+978
	28	140883 5942244	1851	94695 7204912	2221	41079 3125018	+962
	29	129206 6081276	1890	96916 7107996	2187	42041 3082977	+948
	30	137142 6218418	1931	99103 7008893	2156	42989 3039988	+934
	31	135211 +0.6353629	-1966	101259 -0.6907634	+2122	43923 -0.2996065	+918
Feb.	1	+133245 6486874	2002	+103381 6804253	2089	+44841 2951224	+905
	2	131243 6618117	2037	105470 6698783	2057	45746 2905478	+891
	3	129206 6747323	2073	107527 6591256	2025	46637 2858841	+876
	4	127133 6874456	2107	109552 6481704	1994	47513 2811328	+863
	5	125026 +0.6999482	-2144	111546 -0.6370158	+1962	48376 -0.2762952	+851
	6	+122882 7122364	2180	+113508 6256650	1931	+49227 2713725	+837
	7	120702 7243066	2217	115439 6141211	1897	50064 2663661	+822
	8	118485 7361551	2253	117336 6023875	1864	50886 2612775	+809
	9	116232 7477783	2290	119200 5904675	1829	51695 2561080	+795
	10	113942 +0.7591725	-2329	121029 -0.5783646	+1794	52490 -0.2508590	+778
	11	+111613 7703338	2365	+122823 5660823	1755	+53268 2455322	+762
	12	109248 7812586	2399	124578 5536245	1717	54030 2401292	+746
	13	106849 7919435	2436	126295 5409950	1676	54776 2346516	+729
	14	104413 8023848	2469	127971 5281979	1636	55505 2291011	+711
	15	101944 +0.8125792	-2501	129607 -0.5152372	+1593	56216 -0.2234795	+692
	16	+99443 8225235	-2534	+131200 5021172	+1551	+56908 -0.2177887	+675

SUN'S CO-ORDINATES, 1931.

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Date.	MEAN EQUINOX OF 1931.0.								
	X			Y			Z		
Feb. 16	+0.8225235	+ 96909	-2534	-0.5021172	+132751	+1551	-0.2177887	+ 57583	+ 675
17	.8322144	94346	2563	.4888421	134259	1508	.2120304	58237	654
18	.8416490	91754	2592	.4754162	135721	1462	.2062067	58873	636
19	.8508244	89133	2621	.4618441	137139	1418	.2003194	59489	616
20	.8597377	86486	2647	.4481302	138511	1372	.1943705	60084	595
21	+0.8683863	+ 83816	-2670	-0.4342791	+139838	+1327	-0.1883621	+ 60660	+ 576
22	.8767679	81123	2693	.4202953	141117	1279	.1822961	61214	554
23	.8848802	78407	2716	.4061836	142350	1233	.1761747	61749	535
24	.8927209	75670	2737	.3919486	143537	1187	.1699998	62263	514
25	.9002879	72915	2755	.3775949	144677	1140	.1637735	62757	494
26	+0.9075794	+ 70143	-2772	-0.3631272	+145770	+1093	-0.1574978	+ 63229	+ 472
27	.9145937	67355	2788	.3485502	146817	1047	.1511749	63681	452
28	.9213292	64553	2802	.3338685	147818	1001	.1448068	64114	433
Mar. 1	.9277845	61738	2815	.3190867	148774	956	.1383954	64527	413
2	.9339583	58909	2829	.3042093	149685	911	.1319427	64920	393
3	+0.9398492	+ 56069	-2840	-0.2892408	+150554	+ 869	-0.1254507	+ 65295	+ 375
4	.9454561	53217	2852	.2741854	151380	826	.1189212	65653	358
5	.9507778	50352	2865	.2590474	152163	783	.1123559	65992	339
6	.9558130	47474	2878	.2438311	152904	741	.1057567	66313	321
7	.9605604	44582	2892	.2285407	153602	698	.0991254	66615	302
8	+0.9650186	+ 41676	-2906	-0.2131805	+154256	+ 654	-0.0924639	+ 66901	+ 286
9	.9691862	38758	2918	.1977549	154865	609	.0857738	67166	265
10	.9730620	35825	2933	.1822684	155429	564	.0790572	67411	245
11	.9766445	32881	2944	.1667255	155947	518	.0723161	67637	226
12	.9799326	29927	2954	.1511308	156417	470	.0655524	67843	206
13	+0.9829253	+ 26961	-2966	-0.1354891	+156838	+ 421	-0.0587681	+ 68027	+ 184
14	.9856214	23987	2974	.1198053	157212	374	.0519654	68189	162
15	.9880201	21006	2981	.1040841	157535	323	.0451465	68331	142
16	.9901207	18019	2987	.0883306	157808	273	.0383134	68452	121
17	.9919226	15027	2992	.0725498	158033	225	.0314682	68551	99
18	+0.9934253	+ 12032	-2995	-0.0567465	+158207	+ 174	-0.0246131	+ 68627	+ 76
19	.9946285	9036	2996	.0409258	158331	124	.0177504	68680	53
20	.9955321	6040	2996	.0250927	158405	74	.0108824	68713	33
21	.9961361	3043	2997	.0092522	158428	23	.0040111	68723	10
22	.9964404	49	2994	+ .0065906	158403	- 25	+ .0028612	68712	- 11
23	+0.9964453	+ 2939	-2988	+0.0224309	+158326	- 77	+0.0097324	+ 68677	- 35
24	.9961514	5923	2984	.0382635	158201	125	.0166001	68622	55
25	.9955591	8900	2977	.0540836	158026	175	.0234623	68545	77
26	.9946691	11867	2967	.0698862	157803	223	.0303168	68448	97
27	.9934824	14825	2958	.0856665	157533	270	.0371616	68328	120
28	+0.9919999	+ 17772	-2947	+0.1014198	+157217	- 316	+0.0439944	+ 68189	- 139
29	.9902227	20707	2935	.1171415	156855	362	.0508133	68031	158
30	.9881520	23629	2922	.1328270	156449	406	.0576164	67853	178
31	.9857891	26538	2909	.1484719	156001	448	.0644017	67657	196
Apr. 1	.9831353	29436	2898	.1640720	155511	490	.0711674	67444	213
2	+0.9801917	+ 32322	-2886	+0.1796231	+154978	- 533	+0.0779118	+ 67212	- 232
3	+0.9769595	- 2874	-2874	+0.1951209	+154978	- 574	+0.0846330	+ 67212	- 248

SUN'S CO-ORDINATES, 1931.

Date.		MEAN EQUINOX OF 1931.0.								
		X			Y			Z		
Apr.	1	+0.9831353	-29436	-2898	+0.1640720	+155511	-490	+0.0711674	+67444	-213
	2	.9801917	32322	2886	.1796231	154978	533	.0779118	67212	232
	3	.9769595	35196	2874	.1951209	154404	574	.0846330	66964	248
	4	.9734399	38060	2864	.2105613	153790	614	.0913294	66697	267
	5	.9696339	40912	2852	.2259403	153134	656	.0979991	66413	284
	6	+0.9655427	-43755	-2843	+0.2412537	+152434	-700	+0.1046404	+66112	-301
	7	.9611672	46584	2829	.2564971	151692	742	.1112516	65791	321
	8	.9565088	49403	2819	.2716663	150905	787	.1178307	65451	340
	9	.9515685	52208	2805	.2867568	150075	830	.1243758	65093	358
	10	.9463477	54998	2790	.3017643	149200	875	.1308851	64714	379
	11	+0.9408479	-57772	-2774	+0.3166843	+148280	-920	+0.1373565	+64317	-397
	12	.9350707	60529	2757	.3315123	147314	966	.1437882	63900	417
	13	.9290178	63268	2739	.3462437	146306	1008	.1501782	63463	437
	14	.9226910	65986	2718	.3608743	145252	1054	.1565245	63007	456
	15	.9160924	68685	2699	.3753995	144154	1098	.1628252	62532	475
	16	+0.9092239	-71363	-2678	+0.3898149	+143012	-1142	+0.1690784	+62037	-495
	17	.9020876	74015	2652	.4041161	141827	1185	.1752821	61522	515
	18	.8946861	76642	2627	.4182988	140600	1227	.1814343	60990	532
	19	.8870219	79245	2603	.4323588	139328	1272	.1875333	60438	552
	20	.8790974	81821	2576	.4462916	138015	1313	.1935771	59867	571
	21	+0.8709153	-84366	-2545	+0.4600931	+136661	-1354	+0.1995638	+59279	-588
	22	.8624787	86882	2516	.4737592	135268	1393	.2054917	58673	606
	23	.8537905	89367	2485	.4872860	133835	1433	.2113590	58049	624
	24	.8448538	91820	2453	.5006695	132363	1472	.2171639	57410	639
	25	.8356718	94240	2420	.5139058	130857	1506	.2229049	56754	656
	26	+0.8262478	-96629	-2389	+0.5269915	+129315	-1542	+0.2285803	+56084	-670
	27	.8165849	98984	2355	.5399230	127739	1576	.2341887	55400	684
	28	.8066865	101305	2321	.5526969	126131	1608	.2397287	54701	699
	29	.7965560	103595	2290	.5653100	124492	1639	.2451988	53989	712
	30	.7861965	105852	2257	.5777592	122822	1670	.2505977	53265	724
May	1	+0.7756113	-108080	-2228	+0.5900414	+121122	-1700	+0.2559242	+52528	-737
	2	.7648033	110277	2197	.6021536	119391	1731	.2611770	51778	750
	3	.7537756	112443	2166	.6140927	117629	1762	.2663548	51014	764
	4	.7425313	114578	2135	.6258556	115838	1791	.2714562	50238	776
	5	.7310735	116684	2106	.6374394	114014	1824	.2764800	49450	788
	6	+0.7194051	-118759	-2075	+0.6488408	+112158	-1856	+0.2814250	+48647	-803
	7	.7075292	120801	2042	.6600566	110271	1887	.2862897	47829	818
	8	.6954491	122811	2010	.6710837	108352	1919	.2910726	46998	831
	9	.6831680	124785	1974	.6819189	106400	1952	.2957724	46153	845
	10	.6706895	126724	1939	.6925589	104417	1983	.3003877	45294	859
	11	+0.6580171	-128627	-1903	+0.7030006	+102404	-2013	+0.3049171	+44422	-872
	12	.6451544	130493	1866	.7132410	100360	2044	.3093593	43536	886
	13	.6321051	132321	1828	.7232770	98286	2074	.3137129	42638	898
	14	.6188730	134108	1787	.7331056	96183	2103	.3179767	41724	914
	15	.6054622	135857	1749	.7427239	94051	2132	.3221491	40799	925
	16	+0.5918765	-137564	-1707	+0.7521290	+91890	-2161	+0.3262290	+39862	-937
	17	.5781201	137564	1664	.7613180	91890	2189	.3302152	39862	950

Date.	MEAN EQUINOX OF 1931-0.											
	X				Y				Z			
May 17	+0.5781201	-139228	-1664	+0.7613180	+89701	-2189	+0.3302152	+38912	-950			
18	.5641973	140849	1621	.7702881	87487	2214	.3341064	37950	962			
19	.5501124	142425	1576	.7790368	85248	2239	.3379014	36977	973			
20	.5358699	143956	1531	.7875616	82985	2263	.3415991	35994	983			
21	.5214743	145441	1485	.7958601	80699	2286	.3451985	35002	992			
22	+0.5069302	-146880	-1439	+0.8039300	+78392	-2307	+0.3486987	+33999	-1003			
23	.4922422	148272	1392	.8117692	76066	2326	.3520986	32989	1010			
24	.4774150	149619	1347	.8193758	73723	2343	.3553975	31971	1018			
25	.4624531	150920	1301	.8267481	71362	2361	.3585946	30945	1026			
26	.4473611	152176	1256	.8338843	68987	2375	.3616891	29914	1031			
27	+0.4321435	-153387	-1211	+0.8407830	+66596	-2391	+0.3646805	+28877	-1037			
28	.4168048	154555	1168	.8474426	64190	2406	.3675682	27835	1042			
29	.4013493	155681	1126	.8538616	61773	2417	.3703517	26787	1048			
30	.3857812	156764	1083	.8600389	59342	2431	.3730304	25733	1054			
31	.3701048	157806	1042	.8659731	56896	2446	.3756037	24673	1060			
June 1	+0.3543242	-158808	-1002	+0.8716627	+54438	-2458	+0.3780710	+23608	-1065			
2	.3384434	159768	960	.8771065	51964	2474	.3804318	22538	1070			
3	.3224666	160685	917	.8823029	49477	2487	.3826856	21460	1078			
4	.3063981	161560	875	.8872506	46974	2503	.3848316	20377	1083			
5	.2902421	162391	831	.8919480	44459	2515	.3868693	19286	1091			
6	+0.2740030	-163179	-788	+0.8963939	+41930	-2529	+0.3887979	+18190	-1096			
7	.2576851	163922	743	.9005869	39386	2544	.3906169	17088	1102			
8	.2412929	164618	696	.9045255	36831	2555	.3923257	15981	1107			
9	.2248311	165268	650	.9082086	34263	2568	.3939238	14867	1114			
10	.2083043	165872	604	.9116349	31684	2579	.3954105	13749	1118			
11	+0.1917171	-166429	-557	+0.9148033	+29094	-2590	+0.3967854	+12626	-1123			
12	.1750742	166936	507	.9177127	26495	2599	.3980480	11497	1129			
13	.1583806	167395	459	.9203622	23886	2609	.3991977	10364	1133			
14	.1416411	167804	409	.9227508	21268	2618	.4002341	9229	1135			
15	.1248607	168163	359	.9248776	18643	2625	.4011570	8090	1139			
16	+0.1080444	-168470	-307	+0.9267419	+16013	-2630	+0.4019660	+6947	-1143			
17	.0911974	168725	255	.9283432	13380	2633	.4026607	5802	1145			
18	.0743249	168929	204	.9296812	10743	2637	.4032409	4658	1144			
19	.0574320	169080	151	.9307555	8105	2638	.4037067	3511	1147			
20	.0405240	169182	102	.9315660	5468	2637	.4040578	2366	1145			
21	+0.0236058	-169233	-51	+0.9321128	+2833	-2635	+0.4042944	+1222	-1144			
22	.0066825	169235	2	.9323961	201	2632	.4044166	80	1142			
23	.0102410	169188	47	.9324162	2425	2626	.4044246	1059	1139			
24	.0271598	169094	94	.9321737	5048	2623	.4043187	2197	1138			
25	.0440692	168955	139	.9316689	7665	2617	.4040990	3332	1135			
26	-0.0609647	-168772	+183	+0.9309024	+10278	-2613	+0.4037658	+4464	-1132			
27	.0778419	168542	230	.9298746	12885	2607	.4033194	5593	1129			
28	.0946961	168268	274	.9285861	15486	2601	.4027601	6720	1127			
29	.1115229	167953	315	.9270375	18081	2595	.4020881	7844	1124			
30	.1283182	167594	359	.9252294	20673	2592	.4013037	8967	1123			
July 1	-0.1450776	-167192	+402	+0.9231621	+23259	-2586	+0.4004070	+10088	-1121			
2	-0.1617968	-167192	+448	+0.9208362	-23259	-2582	+0.3993982	-10088	-1117			

SUN'S CO-ORDINATES, 1931.

Date.		MEAN EQUINOX OF 1931.0.								
		X			Y			Z		
July	1	-0.1450776	-167192	+402	+0.9231621	-23259	-2586	+0.4004070	-10088	-1121
	2	.1617968	166744	448	.9208362	-25841	2582	.3993982	11205	1117
	3	.1784712	166252	492	.9182521	-28416	2575	.3982777	12320	1115
	4	.1950964	165715	537	.9154105	-30987	2571	.3970457	13435	1115
	5	.2116679	165134	581	.9123118	-33551	2564	.3957022	14548	1113
	6	-0.2281813	-164506	+628	+0.9089567	-36109	-2558	+0.3942474	-15656	-1108
	7	.2446319	163832	674	.9053458	-38658	2549	.3926818	16761	1105
	8	.2610151	163111	721	.9014800	-41200	2542	.3910057	17863	1102
	9	.2773262	162344	767	.8973600	-43732	2532	.3892194	18963	1100
	10	.2935606	161529	815	.8929868	-46255	2523	.3873231	20058	1095
	11	-0.3097135	-160667	+862	+0.8883613	-48768	-2513	+0.3853173	-21148	-1090
	12	.3257802	159757	910	.8834845	-51269	2501	.3832025	22235	1087
	13	.3417559	158798	959	.8783576	-53757	2488	.3809790	23315	1080
	14	.3576357	157791	1007	.8729819	-56232	2475	.3786475	24390	1075
	15	.3734148	156733	1058	.8673587	-58690	2458	.3762085	25459	1069
	16	-0.3890881	-155628	+1105	+0.8614897	-61130	-2440	+0.3736626	-26518	-1059
	17	.4046509	154475	1153	.8553767	-63553	2423	.3710108	27570	1052
	18	.4200984	153276	1199	.8490214	-65954	2401	.3682538	28613	1043
	19	.4354260	152032	1244	.8424260	-68334	2380	.3653925	29646	1033
	20	.4506292	150743	1289	.8355926	-70691	2357	.3624279	30669	1023
	21	-0.4657035	-149412	+1331	+0.8285235	-73025	-2334	+0.3593610	-31681	-1012
	22	.4806447	148041	1371	.8212210	-75335	2310	.3561929	32683	1002
	23	.4954488	146629	1412	.8136875	-77621	2286	.3529246	33674	991
	24	.5101117	145178	1451	.8059254	-79885	2264	.3495572	34653	979
	25	.5246295	143690	1488	.7979369	-82123	2238	.3460919	35624	971
	26	-0.5389985	-142165	+1525	+0.7897246	-84340	-2217	+0.3425295	-36584	-960
	27	.5532150	140603	1562	.7812906	-86534	2194	.3388711	37533	949
	28	.5672753	139003	1600	.7726372	-88704	2170	.3351178	38472	939
	29	.5811756	137368	1635	.7637668	-90850	2146	.3312706	39402	930
	30	.5949124	135697	1671	.7546818	-92975	2125	.3273304	40323	921
Aug.	31	-0.6084821	-133987	+1710	+0.7453843	-95075	-2100	+0.3232981	-41233	-910
	1	.6218808	132240	1747	.7358768	-97153	2078	.3191748	42133	900
	2	.6351048	130456	1784	.7261615	-99207	2054	.3149615	43023	890
	3	.6481504	128635	1821	.7162408	-101235	2028	.3106592	43903	880
	4	.6610139	126777	1858	.7061173	-103238	2003	.3062689	44772	869
	5	-0.6736916	-124881	+1896	+0.6957935	-105215	-1977	+0.3017917	-45630	-858
	6	.6861797	122947	1934	.6852720	-107166	1951	.2972287	46478	848
	7	.6984744	120976	1971	.6745554	-109090	1924	.2925809	47312	834
	8	.7105720	118969	2007	.6636464	-110985	1895	.2878497	48136	824
	9	.7224689	116922	2047	.6525479	-112852	1867	.2830361	48947	811
	10	-0.7341611	-114837	+2085	+0.6412627	-114688	-1836	+0.2781414	-49744	-797
	11	.7456448	112714	2123	.6297939	-116493	1805	.2731670	50529	785
	12	.7569162	110555	2159	.6181446	-118266	1773	.2681141	51299	770
	13	.7679717	108360	2195	.6063180	-120003	1737	.2629842	52055	756
	14	.7788077	106129	2231	.5943177	-121703	1700	.2577787	52795	740
	15	-0.7894206	-103863	+2266	+0.5821474	-123368	-1665	+0.2524992	-53517	-722
	16	.7998069	101529	2297	.5698106	-125003	1627	.2471475	54257	704

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Date.	MEAN EQUINOX OF 1931.0.											
	X				Y				Z			
Aug. 16	-0.7998069	-101566	+2297	+0.5698106	-124995	-1627	+0.2471475	-54221	-704			
17	.8099635	99238	2328	.5573111	126582	1587	.2417254	54910	689			
18	.8198873	96883	2355	.5446529	128129	1547	.2362344	55582	672			
19	.8295756	94500	2383	.5318400	129639	1510	.2306762	56236	654			
20	.8390256	92092	2408	.5188761	131108	1469	.2250526	56872	636			
21	-0.8482348	-89660	+2432	+0.5057653	-132540	-1432	+0.2193654	-57492	-620			
22	.8572008	87205	2455	.4925113	133934	1394	.2136162	58094	602			
23	.8659213	84727	2478	.4791179	135292	1358	.2078068	58681	587			
24	.8743940	82227	2500	.4655887	136612	1320	.2019387	59252	571			
25	.8826167	79704	2523	.4519275	137893	1281	.1960135	59807	555			
26	-0.8905871	-77160	+2544	+0.4381382	-139139	-1246	+0.1900328	-60346	-539			
27	.8983031	74595	2565	.4242243	140348	1209	.1839982	60870	524			
28	.9057626	72008	2587	.4101895	141520	1172	.1779112	61376	506			
29	.9129634	69399	2609	.3960375	142653	1133	.1717736	61867	491			
30	.9199033	66769	2630	.3817722	143751	1098	.1655869	62344	477			
31	-0.9265802	-64117	+2652	+0.3673971	-144810	-1059	+0.1593525	-62803	-459			
Sept. 1	.9329919	61445	2672	.3529161	145830	1020	.1530722	63246	443			
2	.9391364	58752	2693	.3383331	146812	982	.1467476	63672	426			
3	.9450116	56038	2714	.3236519	147754	942	.1403804	64082	410			
4	.9506154	53305	2733	.3088765	148656	902	.1339722	64474	392			
5	-0.9559459	-50551	+2754	+0.2940109	-149517	-861	+0.1275248	-64848	-374			
6	.9610010	47776	2775	.2790592	150338	821	.1210400	65207	359			
7	.9657786	44983	2793	.2640254	151116	778	.1145193	65547	340			
8	.9702769	42170	2813	.2489138	151850	734	.1079646	65866	319			
9	.9744939	39340	2830	.2337288	152541	691	.1013780	66167	301			
10	-0.9784279	-36492	+2848	+0.2184747	-153185	-644	+0.0947613	-66449	-282			
11	.9820771	33627	2865	.2031562	153782	597	.0881164	66708	259			
12	.9854398	30748	2879	.1877780	154331	549	.0814456	66946	238			
13	.9885146	27859	2889	.1723449	154831	500	.0747510	67164	218			
14	.9913005	24959	2900	.1568618	155283	452	.0680346	67359	195			
15	-0.9937964	-22051	+2908	+0.1413335	-155686	-403	+0.0612987	-67533	-174			
16	.9960015	19139	2912	.1257649	156041	355	.0545454	67687	154			
17	.9979154	16222	2917	.1101608	156349	308	.0477767	67818	131			
18	0.9995376	13302	2920	.0945259	156609	260	.0409949	67930	112			
19	1.0008678	10379	2923	.0788650	156825	216	.0342019	68022	92			
20	-1.0019057	-7454	+2925	+0.0631825	-156995	-170	+0.0273997	-68094	-72			
21	1.0026511	4529	2925	.0474830	157121	126	.0205903	68147	53			
22	1.0031040	1602	2927	.0317709	157203	82	.0137756	68181	34			
23	1.0032642	1324	2926	.0160506	157241	38	.0069575	68196	15			
24	1.0031318	4251	2927	+0.0003265	157236	5	+0.0001379	68192	4			
25	-1.0027067	-7180	+2929	-0.0153971	-157187	49	-0.0066813	-68171	21			
26	1.0019887	10108	2928	.0311158	157094	93	.0134984	68131	40			
27	1.0009779	13035	2927	.0468252	156956	138	.0203115	68071	60			
28	0.9996744	15962	2927	.0625208	156777	179	.0271186	67994	77			
29	.9980782	18887	2925	.0781985	156553	224	.0339180	67897	97			
30	-0.9961895	-21811	+2924	-0.0938538	-156285	268	-0.0407077	-67781	116			
Oct. 1	-0.9940084	-2921	+2921	-0.1094823	-156285	313	-0.0474858	-67781	134			

SUN'S CO-ORDINATES, 1931.

		MEAN EQUINOX OF 1931-0.					
Date.		X		Y		Z	
Oct.	1	-0.9940084	+2473 ² +2921	-0.1094823	+15597 ² +313	-0.0474858	+67647 +134
	2	.9915352	2765 ² 2920	.1250795	155615 357	.0542505	67494 153
	3	.9887700	30569 2917	.1406410	155213 402	.0609999	67320 174
	4	.9857131	33484 2915	.1561623	154765 448	.0677319	67128 192
	5	.9823647	36394 2910	.1716388	154273 492	.0744447	66916 212
	6	-0.9787253	+39301 +2907	-0.1870661	+153732 +541	-0.0811363	+66683 +233
	7	.9747952	42201 2900	.2024393	153143 589	.0878046	66430 253
	8	.9705751	45094 2893	.2177536	152507 636	.0944476	66155 275
	9	.9660657	47978 2884	.2330043	151821 686	.1010631	65857 298
	10	.9612679	50854 2876	.2481864	151084 737	.1076488	65538 319
	11	-0.9561825	+53717 +2863	-0.2632948	+150299 +785	-0.1142026	+65197 +341
	12	.9508108	56564 2847	.2783247	149464 835	.1207223	64835 362
	13	.9451544	59394 2830	.2932711	148581 883	.1272058	64451 384
	14	.9392150	62205 2811	.3081292	147649 932	.1336509	64045 406
	15	.9329945	64997 2792	.3228941	146670 979	.1400554	63619 426
	16	-0.9264948	+67767 +2770	-0.3375611	+145647 +1023	-0.1464173	+63174 +445
	17	.9197181	70515 2748	.3521258	144579 1068	.1527347	62709 465
	18	.9126666	73240 2725	.3665837	143468 1111	.1590056	62225 484
	19	.9053426	75942 2702	.3809305	142316 1152	.1652281	61725 500
	20	.8977484	78622 2680	.3951621	141122 1194	.1714006	61205 520
	21	-0.8898862	+81279 +2657	-0.4092743	+139887 +1235	-0.1775211	+60668 +537
	22	.8817583	83912 2633	.4232630	138612 1275	.1835879	60115 553
	23	.8733671	86522 2610	.4371242	137296 1316	.1895994	59544 571
	24	.8647149	89109 2587	.4508538	135940 1356	.1955538	58955 589
	25	.8558040	91671 2562	.4644478	134546 1394	.2014493	58351 604
	26	-0.8466369	+94207 +2536	-0.4779024	+133111 +1435	-0.2072844	+57729 +622
	27	.8372162	96719 2512	.4912135	131639 1472	.2130573	57091 638
	28	.8275443	99207 2488	.5043774	130127 1512	.2187664	56437 654
	29	.8176236	101668 2461	.5173901	128576 1551	.2244101	55766 671
	30	.8074568	104104 2436	.5302477	126987 1589	.2299867	55077 689
Nov.	31	-0.7970464	+106515 +2411	-0.5429464	+125359 +1628	-0.2354944	+54373 +704
	1	.7863949	108897 2382	.5554823	123692 1667	.2409317	53651 722
	2	.7755052	111252 2355	.5678515	121985 1707	.2462968	52912 739
	3	.7643800	113580 2328	.5800500	120238 1747	.2515880	52157 755
	4	.7530220	115877 2297	.5920738	118452 1786	.2568037	51383 774
	5	-0.7414343	+118145 +2268	-0.6039190	+116626 +1826	-0.2619420	+50591 +792
	6	.7296198	120379 2234	.6155816	114759 1867	.2670011	49782 809
	7	.7175819	122578 2199	.6270575	112851 1908	.2719793	48955 827
	8	.7053241	124742 2164	.6383426	110904 1947	.2768748	48110 845
	9	.6928499	126867 2125	.6494330	108918 1986	.2816858	47247 863
	10	-0.6801632	+128952 +2085	-0.6603248	+106894 +2024	-0.2864105	+46369 +878
	11	.6672680	130995 2043	.6710142	104835 2059	.2910474	45474 895
	12	.6541685	132996 2001	.6814977	102739 2096	.2955948	44563 911
	13	.6408689	134953 1957	.6917716	100611 2128	.3000511	43639 924
	14	.6273736	136866 1913	.7018327	98453 2158	.3044150	42702 937
	15	-0.6136870	+138734 +1868	-0.7116780	+96265 +2188	-0.3086852	+41750 +952
	16	-0.5998136	+1825 +1825	-0.7213045	+2218 +2218	-0.3128602	+41750 +963

Date.	MEAN EQUINOX OF 1931.0.								
	X			Y			Z		
Nov. 16	-0.5998136	+140559	+1825	-0.7213045	-94047	+2218	-0.3128602	-40787	+963
17	.5857577	142341	1782	.7307092	91801	2246	.3169389	39812	975
18	.5715236	144078	1737	.7398893	89528	2273	.3209201	38825	987
19	.5571158	145772	1694	.7488421	87230	2298	.3248026	37828	997
20	.5425386	147421	1649	.7575651	84906	2324	.3285854	36821	1007
21	-0.5277965	+149026	+1605	-0.7660557	-82556	+2350	-0.3322675	-35801	+1020
22	.5128939	150589	1563	.7743113	80183	2373	.3358476	34772	1029
23	.4978350	152107	1518	.7823296	77786	2397	.3393248	33733	1039
24	.4826243	153581	1474	.7901082	75365	2421	.3426981	32684	1049
25	.4672662	155010	1429	.7976447	72923	2442	.3459665	31625	1059
26	-0.4517652	+156396	+1386	-0.8049370	-70457	+2466	-0.3491290	-30558	+1067
27	.4361256	157737	1341	.8119827	67970	2487	.3521848	29481	1077
28	.4203519	159035	1298	.8187797	65460	2510	.3551329	28395	1086
29	.4044484	160288	1253	.8253257	62930	2530	.3579724	27297	1098
30	.3884196	161496	1208	.8316187	60377	2553	.3607021	26191	1106
Dec. 1	-0.3722700	+162656	+1160	-0.8376564	-57801	+2576	-0.3633212	-25076	+1115
2	.3560044	163771	1115	.8434365	55204	2597	.3658288	23951	1125
3	.3396273	164837	1066	.8489569	52585	2619	.3682239	22815	1136
4	.3231436	165853	1016	.8542154	49945	2640	.3705054	21669	1146
5	.3065583	166819	966	.8592099	47286	2659	.3726723	20516	1153
6	-0.2898764	+167731	+912	-0.8639385	-44606	+2680	-0.3747239	-19353	+1163
7	.2731033	168590	859	.8683991	41908	2698	.3766592	18182	1171
8	.2562443	169394	804	.8725899	39194	2714	.3784774	17003	1179
9	.2393049	170142	748	.8765093	36464	2730	.3801777	15818	1185
10	.2222907	170832	690	.8801557	33722	2742	.3817595	14626	1192
11	-0.2052075	+171465	+633	-0.8835279	-30969	+2753	-0.3832221	-13431	+1195
12	.1880610	172042	577	.8866248	28206	2763	.3845652	12231	1200
13	.1708568	172563	521	.8894454	25435	2771	.3857883	11028	1203
14	.1536005	173027	464	.8919889	22659	2776	.3868911	9823	1205
15	.1362978	173437	410	.8942548	19877	2782	.3878734	8615	1208
16	-0.1189541	+173793	+356	-0.8962425	-17090	+2787	-0.3887349	-7406	+1209
17	.1015748	174092	299	.8979515	14301	2789	.3894755	6197	1209
18	.0841656	174339	247	.8993816	11508	2793	.3900952	4985	1212
19	.0667317	174533	194	.9005324	8714	2794	.3905937	3774	1211
20	.0492784	174673	140	.9014038	5921	2793	.3909711	2562	1212
21	-0.0318111	+174761	+88	-0.9019959	-3126	+2795	-0.3912273	-1351	+1211
22	.0143350	174796	35	.9023085	330	2796	.3913624	140	1211
23	.0031446	174781	15	.9023415	2464	2794	.3913764	1071	1211
24	.0206227	174714	67	.9020951	5255	2791	.3912693	2280	1209
25	.0380941	174596	118	.9015696	8045	2790	.3910413	3488	1208
26	+0.0555537	+174428	+168	-0.9007651	-10834	+2789	-0.3906925	-4697	+1209
27	.0729965	174209	219	.8996817	13620	2786	.3902228	5904	1207
28	.0904174	173939	270	.8983197	16405	2785	.3896324	7110	1206
29	.1078113	173619	320	.8966792	19187	2782	.3889214	8316	1206
30	.1251732	173245	374	.8947605	21967	2780	.3880898	9521	1205
31	+0.1424977	+172819	+426	-0.8925638	-24744	+2777	-0.3871377	-10725	+1204
32	+0.1597796	+172819	+480	-0.8900894	-24744	+2773	-0.3860652	-10725	+1204

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Date.	Longitude.				Latitude.		Radius Vector.	
Jan.	1	279°	•88317	52° 59' 4"	— 0°00224	— 8' 1"	0°983 2605	— 124
	2	280	•90214	54 07' 7"	•00221	8' 0	•983 2481	— 61
	3	281	•92107	55 15' 8"	•00217	7' 8	•983 2420	+ 3
	4	282	•93998	56 23' 9"	•00214	7' 7	•983 2423	70
	5	283	•95886	57 31' 9"	•00212	7' 6	•983 2493	136
	6	284	•97774	58 39' 9"	— 0°00211	— 7' 6	0°983 2629	+ 203
	7	285	•99662	59 47' 8"	•00211	7' 6	•983 2832	267
	8	287	•01551	00 55' 8"	•00211	7' 6	•983 3099	328
	9	288	•03441	02 03' 9"	•00212	7' 6	•983 3427	386
	10	289	•05333	03 12' 0"	•00213	7' 7	•983 3813	441
	11	290	•07226	04 20' 1"	— 0°00215	— 7' 7	0°983 4254	+ 493
	12	291	•09120	05 28' 3"	•00217	7' 8	•983 4747	541
	13	292	•11013	06 36' 5"	•00218	7' 9	•983 5288	586
	14	293	•12903	07 44' 5"	•00219	7' 9	•983 5874	630
	15	294	•14789	08 52' 4"	•00219	7' 9	•983 6504	669
	16	295	•16668	10 00' 0"	— 0°00219	— 7' 9	0°983 7173	+ 707
	17	296	•18537	11 07' 3"	•00218	7' 9	•983 7880	745
	18	297	•20394	12 14' 2"	•00216	7' 8	•983 8625	782
	19	298	•22237	13 20' 5"	•00214	7' 7	•983 9407	819
	20	299	•24063	14 26' 3"	•00210	7' 6	•984 0226	856
	21	300	•25869	15 31' 3"	— 0°00206	— 7' 4	0°984 1082	+ 893
	22	301	•27654	16 35' 5"	•00200	7' 2	•984 1975	931
	23	302	•29415	17 38' 9"	•00195	7' 0	•984 2906	971
	24	303	•31150	18 41' 4"	•00189	6' 8	•984 3877	1012
	25	304	•32858	19 42' 9"	•00183	6' 6	•984 4889	1054
	26	305	•34536	20 43' 3"	— 0°00176	— 6' 3	0°984 5943	+ 1099
	27	306	•36183	21 42' 6"	•00170	6' 1	•984 7042	1144
	28	307	•37798	22 40' 7"	•00164	5' 9	•984 8186	1194
	29	308	•39379	23 37' 7"	•00158	5' 7	•984 9380	1245
	30	309	•40927	24 33' 4"	•00153	5' 5	•985 0625	1300
Feb.	31	310	•42440	25 27' 9"	— 0°00148	— 5' 3	0°985 1925	+ 1355
	1	311	•43919	26 21' 1"	•00144	5' 2	•985 3280	1413
	2	312	•45365	27 13' 1"	•00142	5' 1	•985 4693	1473
	3	313	•46779	28 04' 0"	•00140	5' 0	•985 6166	1532
	4	314	•48162	28 53' 8"	•00138	5' 0	•985 7698	1590
	5	315	•49515	29 42' 5"	— 0°00138	— 5' 0	0°985 9288	+ 1647
	6	316	•50840	30 30' 2"	•00138	5' 0	•986 0935	1700
	7	317	•52137	31 16' 9"	•00138	5' 0	•986 2635	1751
	8	318	•53408	32 02' 7"	•00138	5' 0	•986 4386	1797
	9	319	•54652	32 47' 5"	•00138	5' 0	•986 6183	1840
	10	320	•55868	33 31' 2"	— 0°00138	— 5' 0	0°986 8023	+ 1878
	11	321	•57056	34 14' 0"	•00136	4' 9	•986 9901	1914
	12	322	•58214	34 55' 7"	•00135	4' 9	•987 1815	1946
	13	323	•59340	35 36' 2"	•00133	4' 8	•987 3761	1976
	14	324	•60433	36 15' 6"	•00129	4' 6	•987 5737	2004
	15	325	•61491	36 53' 7"	— 0°00125	— 4' 5	0°987 7741	+ 2029
	16	326	•62512	37 30' 4"	— 0°00120	— 4' 3	0°987 9770	

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Date.		Longitude.				Latitude.		Radius Vector.		
Feb.	16	326	62512	1°00982	37 30.4	3635.4	- 0°00120	- 4.3	0.987 9770	+2053
	17	327	63494	00940	38 05.8	3633.8	00115	4.1	988 1823	2077
	18	328	64434	00897	38 39.6	3632.3	00109	3.9	988 3900	2099
	19	329	65331	00852	39 11.9	3630.7	00102	3.7	988 5999	2121
	20	330	66183	00805	39 42.6	3628.9	00094	3.4	988 8120	2145
	21	331	66988	1°00755	40 11.5	3627.2	- 0°00087	- 3.1	0.989 0265	+2167
	22	332	67743	00704	40 38.7	3625.4	00080	2.9	989 2432	2191
	23	333	68447	00652	41 04.1	3623.5	00072	2.6	989 4623	2216
	24	334	69099	00599	41 27.6	3621.5	00065	2.3	989 6839	2242
	25	335	69698	00543	41 49.1	3619.6	00058	2.1	989 9081	2269
	26	336	70241	1°00487	42 08.7	3617.5	- 0°00052	- 1.9	0.990 1350	+2299
	27	337	70728	00430	42 26.2	3615.5	00046	1.7	990 3649	2333
Mar.	28	338	71158	00374	42 41.7	3613.5	00041	1.5	990 5982	2367
	1	339	71532	00319	42 55.2	3611.4	00037	1.3	990 8349	2404
	2	340	71851	00263	43 06.6	3609.5	00034	1.2	991 0753	2444
	3	341	72114	1°00209	43 16.1	3607.5	- 0°00032	- 1.2	0.991 3197	+2484
	4	342	72323	00158	43 23.6	3605.7	00031	1.1	991 5681	2524
	5	343	72481	00108	43 29.3	3603.9	00030	1.1	991 8205	2564
	6	344	72589	00060	43 33.2	3602.2	00029	1.1	992 0769	2602
	7	345	72649	1°00013	43 35.4	3600.4	00029	1.0	992 3371	2637
	8	346	72662	0°99967	43 35.8	3598.9	- 0°00029	- 1.0	0.992 6008	+2669
	9	347	72629	99923	43 34.7	3597.2	00028	1.0	992 8677	2695
	10	348	72552	99877	43 31.9	3595.5	00027	1.0	993 1372	2718
	11	349	72429	99832	43 27.4	3594.0	00025	0.9	993 4090	2738
	12	350	72261	99785	43 21.4	3592.3	00022	0.8	993 6828	2755
	13	351	72046	0°99738	43 13.7	3590.5	- 0°00019	- 0.7	0.993 9583	+2767
	14	352	71784	99691	43 04.2	3588.9	00014	0.5	994 2350	2777
	15	353	71475	99641	42 53.1	3587.1	00009	0.3	994 5127	2784
	16	354	71116	99590	42 40.2	3585.2	- 00004	- 0.1	994 7911	2789
	17	355	70706	99538	42 25.4	3583.4	+ 00003	+ 0.1	995 0700	2792
	18	356	70244	0°99484	42 08.8	3581.4	+ 0°00010	+ 0.4	0.995 3492	+2793
	19	357	69728	99428	41 50.2	3579.4	00018	0.6	995 6285	2793
	20	358	69156	99372	41 29.6	3577.4	00025	0.9	995 9078	2793
	21	359	68528	99314	41 07.0	3575.3	00033	1.2	996 1871	2792
	22	0	67842	99254	40 42.3	3573.1	00041	1.5	996 4663	2790
	23	1	67096	0°99192	40 15.4	3571.0	+ 0°00048	+ 1.7	0.996 7453	+2789
	24	2	66288	99130	39 46.4	3568.7	00056	2.0	997 0242	2789
	25	3	65418	99067	39 15.1	3566.4	00062	2.2	997 3031	2789
	26	4	64485	99002	38 41.5	3564.0	00068	2.4	997 5820	2793
	27	5	63487	98936	38 05.5	3561.7	00073	2.6	997 8613	2797
	28	6	62423	0°98871	37 27.2	3559.4	+ 0°00077	+ 2.8	0.998 1410	+2804
	29	7	61294	98806	36 46.6	3557.0	00080	2.9	998 4214	2814
30	8	60100	98743	36 03.6	3554.7	00083	3.0	998 7028	2826	
Apr.	31	9	58843	98679	35 18.3	3552.5	00084	3.0	998 9854	2841
	1	10	57522	98619	34 30.8	3550.3	00084	3.0	999 2695	2856
	2	11	56141	0°98559	33 41.1	3548.1	+ 0°00085	+ 3.1	0.999 5551	+2872
	3	12	54700		32 49.2		+ 0°00085	+ 3.1	0.999 8423	

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Date.		Longitude.			Latitude.		Radius Vector.	
Apr.	1	10° 57522	0° 98619	34 30.8	+ 0.00084	+ 3.0	0.999 2695	+2856
	2	11° 56141	0° 98559	33 41.1	0.00085	3.1	0.999 5551	2872
	3	12° 54700	0° 98504	32 49.2	0.00085	3.1	0.999 8423	2888
	4	13° 53204	0° 98449	31 55.3	0.00085	3.1	1.000 1311	2902
	5	14° 51653	0° 98398	30 59.5	0.00085	3.1	1.000 4213	2912
	6	15° 50051	0° 98347	30 01.8	+ 0.00086	+ 3.1	1.000 7125	+2920
	7	16° 48398	0° 98297	29 02.3	0.00087	3.1	0.001 0045	2925
	8	17° 46695	0° 98249	28 01.0	0.00089	3.2	0.001 2970	2924
	9	18° 44944	0° 98200	26 58.0	0.00092	3.3	0.001 5894	2921
	10	19° 43144	0° 98152	25 53.2	0.00095	3.4	0.001 8815	2915
	11	20° 41296	0° 98104	24 46.7	+ 0.00099	+ 3.6	1.002 1730	+2904
	12	21° 39400	0° 98055	23 38.4	0.00104	3.8	0.002 4634	2890
	13	22° 37455	0° 98004	22 28.4	0.00110	4.0	0.002 7524	2875
	14	23° 35459	0° 97955	21 16.5	0.00116	4.2	0.003 0399	2856
	15	24° 33414	0° 97905	20 02.9	0.00123	4.4	0.003 3255	2835
	16	25° 31319	0° 97852	18 47.5	+ 0.00130	+ 4.7	1.003 6090	+2813
	17	26° 29171	0° 97800	17 30.2	0.00137	4.9	0.003 8903	2788
	18	27° 26971	0° 97745	16 10.9	0.00144	5.2	0.004 1691	2763
	19	28° 24716	0° 97691	14 49.8	0.00151	5.4	0.004 4454	2737
	20	29° 22407	0° 97634	13 26.6	0.00157	5.7	0.004 7191	2709
	21	30° 20041	0° 97577	12 01.5	+ 0.00163	+ 5.9	1.004 9900	+2683
	22	31° 17618	0° 97518	10 34.3	0.00169	6.1	0.005 2583	2657
	23	32° 15136	0° 97459	09 04.9	0.00173	6.2	0.005 5240	2633
	24	33° 12595	0° 97399	07 33.4	0.00176	6.3	0.005 7873	2610
	25	34° 09994	0° 97340	05 59.8	0.00179	6.4	0.006 0483	2590
	26	35° 07334	0° 97279	04 24.0	+ 0.00180	+ 6.5	1.006 3073	+2572
	27	36° 04613	0° 97220	02 46.1	0.00181	6.5	0.006 5645	2557
	28	37° 01833	0° 97162	01 06.0	0.00181	6.5	0.006 8202	2545
	29	37° 98995	0° 97106	59 23.8	0.00181	6.5	0.007 0747	2534
	30	38° 96101	0° 97052	57 39.6	0.00179	6.5	0.007 3281	2526
May	1	39° 93153	0° 97001	55 53.5	+ 0.00178	+ 6.4	1.007 5807	+2518
	2	40° 90154	0° 96951	54 05.5	0.00177	6.4	0.007 8325	2510
	3	41° 87105	0° 96905	52 15.8	0.00176	6.3	0.008 0835	2500
	4	42° 84010	0° 96861	50 24.4	0.00176	6.3	0.008 3335	2490
	5	43° 80871	0° 96820	48 31.4	0.00177	6.4	0.008 5825	2476
	6	44° 77691	0° 96779	46 36.9	+ 0.00178	+ 6.4	1.008 8301	+2458
	7	45° 74470	0° 96740	44 40.9	0.00180	6.5	0.009 0759	2437
	8	46° 71210	0° 96702	42 43.6	0.00183	6.6	0.009 3196	2413
	9	47° 67912	0° 96665	40 44.8	0.00186	6.7	0.009 5609	2386
	10	48° 64577	0° 96628	38 44.8	0.00191	6.9	0.009 7995	2356
	11	49° 61205	0° 96591	36 43.4	+ 0.00195	+ 7.0	1.010 0351	+2323
	12	50° 57796	0° 96554	34 40.7	0.00200	7.2	0.010 2674	2287
	13	51° 54350	0° 96518	32 36.6	0.00206	7.4	0.010 4961	2249
	14	52° 50868	0° 96481	30 31.2	0.00211	7.6	0.010 7210	2208
	15	53° 47349	0° 96443	28 24.5	0.00217	7.8	0.010 9418	2165
	16	54° 43792	0° 96406	26 16.5	+ 0.00222	+ 8.0	1.011 1583	+2120
	17	55° 40198	0° 96370	24 07.1	+ 0.00227	+ 8.2	1.011 3703	

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Date.		Longitude.				Latitude.		Radius Vector.		
May	17	55	°40198	°096366	24 07.1	+	0°00227	+ 8.2	I·011 3703	+2074
	18	56	°36564	°96327	21 56.3		°00231	8.3	°011 5777	2026
	19	57	°32891	°96287	19 44.1		°00235	8.5	°011 7803	1979
	20	58	°29178	°96244	17 30.4		°00238	8.6	°011 9782	1931
	21	59	°25422	°96202	15 15.2		°00240	8.6	°012 1713	1885
	22	60	°21624	°096159	12 58.5	+	0°00242	+ 8.7	I·012 3598	+1840
	23	61	°17783	°96115	10 40.2		°00242	8.7	°012 5438	1798
	24	62	°13898	°96072	08 20.3		°00242	8.7	°012 7236	1758
	25	63	°09970	°96029	05 58.9		°00240	8.6	°012 8994	1722
	26	64	°05999	°95987	03 36.0		°00238	8.6	°013 0716	1687
	27	65	°01986	°095947	01 11.5	+	0°00235	+ 8.5	I·013 2403	+1656
	28	65	°97933	°95907	58 45.6		°00233	8.4	°013 4059	1627
	29	66	°93840	°95872	56 18.2		°00230	8.3	°013 5686	1600
	30	67	°89712	°95838	53 49.6		°00227	8.2	°013 7286	1575
	31	68	°85550	°95807	51 19.8		°00226	8.1	°013 8861	1549
June	1	69	°81357	°095779	48 48.9	+	0°00224	+ 8.1	I·014 0410	+1523
	2	70	°77136	°95753	46 16.9		°00224	8.1	°014 1933	1496
	3	71	°72889	°95731	43 44.0		°00224	8.1	°014 3429	1465
	4	72	°68620	°95709	41 10.3		°00224	8.1	°014 4894	1434
	5	73	°64329	°95689	38 35.8		°00226	8.1	°014 6328	1399
	6	74	°60018	°095671	36 00.6	+	0°00228	+ 8.2	I·014 7727	+1362
	7	75	°55689	°95654	33 24.8		°00231	8.3	°014 9089	1321
	8	76	°51343	°95637	30 48.3		°00234	8.4	°015 0410	1279
	9	77	°46980	°95622	28 11.3		°00238	8.6	°015 1689	1234
	10	78	°42602	°95607	25 33.7		°00241	8.7	°015 2923	1186
	11	79	°38209	°095593	22 55.5	+	0°00245	+ 8.8	I·015 4109	+1135
	12	80	°33802	°95579	20 16.9		°00249	9.0	°015 5244	1083
	13	81	°29381	°95564	17 37.7		°00252	9.1	°015 6327	1027
	14	82	°24945	°95550	14 58.0		°00255	9.2	°015 7354	971
	15	83	°20495	°95534	12 17.8		°00257	9.2	°015 8325	911
	16	84	°16029	°095517	09 37.0	+	0°00258	+ 9.3	I·015 9236	+ 851
	17	85	°11546	°95500	06 55.7		°00258	9.3	°016 0087	791
	18	86	°07046	°95482	04 13.7		°00258	9.3	°016 0878	731
	19	87	°02528	°95463	01 31.0		°00257	9.3	°016 1609	674
	20	87	°97991	°95443	58 47.7		°00255	9.2	°016 2283	617
	21	88	°93434	°095423	56 03.6	+	0°00252	+ 9.1	I·016 2900	+ 563
	22	89	°88857	°95403	53 18.8		°00248	8.9	°016 3463	514
	23	90	°84260	°95384	50 33.4		°00244	8.8	°016 3977	467
	24	91	°79644	°95366	47 47.2		°00239	8.6	°016 4444	422
	25	92	°75010	°95349	45 00.3		°00235	8.5	°016 4866	382
	26	93	°70359	°095335	42 12.9	+	0°00231	+ 8.3	I·016 5248	+ 344
	27	94	°65694	°95324	39 25.0		°00227	8.2	°016 5592	308
	28	95	°61018	°95313	36 36.6		°00224	8.1	°016 5900	274
	29	96	°56331	°95307	33 47.9		°00221	8.0	°016 6174	240
	30	97	°51638	°95302	30 59.0		°00219	7.9	°016 6414	206
July	1	98	°46940	°095301	28 09.9	+	0°00218	+ 7.8	I·016 6620	+ 171
	2	99	°42241		25 20.7	+	0°00218	+ 7.8	I·016 6791	

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Date.		Longitude.		Latitude.		Radius Vector.	
July	1	98°	·46940 °95301	28 09·9 3430·8	+ 0·00218 + 7·8	1·016 6620	+ 171
	2	99	·42241 °95301	25 20·7 3430·8	·00218 7·8	·016 6791	136
	3	100	·37542 °95304	22 31·5 3431·0	·00218 7·8	·016 6927	99
	4	101	·32846 °95310	19 42·5 3431·1	·00219 7·9	·016 7026	60
	5	102	·28156 °95315	16 53·6 3431·4	·00221 7·9	·016 7086	+ 18
	6	103	·23471 °95323	14 05·0 3431·6	+ 0·00222 + 8·0	1·016 7104	- 25
	7	104	·18794 °95332	11 16·6 3432·0	·00224 8·1	·016 7079	71
	8	105	·14126 °95343	08 28·6 3432·3	·00226 8·1	·016 7008	118
	9	106	·09469 °95353	05 40·9 3432·7	·00228 8·2	·016 6890	168
	10	107	·04822 °95365	02 53·6 3433·1	·00229 8·2	·016 6722	220
	11	108	·00187 °95377	00 06·7 3433·6	+ 0·00230 + 8·3	1·016 6502	- 275
	12	108	·95564 °95389	57 20·3 3434·0	·00230 8·3	·016 6227	332
	13	109	·90953 °95401	54 34·3 3434·5	·00230 8·3	·016 5895	392
	14	110	·86354 °95412	51 48·8 3434·8	·00229 8·2	·016 5503	452
	15	111	·81766 °95422	49 03·6 3435·2	·00226 8·1	·016 5051	515
	16	112	·77188 °95432	46 18·8 3435·5	+ 0·00224 + 8·0	1·016 4536	- 577
	17	113	·72620 °95439	43 34·3 3435·8	·00220 7·9	·016 3959	638
	18	114	·68059 °95446	40 50·1 3436·1	·00215 7·7	·016 3321	698
	19	115	·63505 °95453	38 06·2 3436·3	·00210 7·5	·016 2623	755
	20	116	·58958 °95458	35 22·5 3436·5	·00204 7·3	·016 1868	809
	21	117	·54416 °95465	32 39·0 3436·7	+ 0·00198 + 7·1	1·016 1059	- 859
	22	118	·49881 °95471	29 55·7 3437·0	·00191 6·9	·016 0200	906
	23	119	·45352 °95479	27 12·7 3437·2	·00186 6·7	·015 9294	948
	24	120	·40831 °95488	24 29·9 3437·6	·00180 6·5	·015 8346	988
	25	121	·36319 °95500	21 47·5 3438·0	·00175 6·3	·015 7358	1026
	26	122	·31819 °95512	19 05·5 3438·4	+ 0·00171 + 6·2	1·015 6332	- 1060
	27	123	·27331 °95529	16 23·9 3439·1	·00168 6·0	·015 5272	1093
	28	124	·22860 °95546	13 43·0 3439·6	·00165 5·9	·015 4179	1125
	29	125	·18406 °95567	11 02·6 3440·4	·00163 5·9	·015 3054	1155
	30	126	·13973 °95590	08 23·0 3441·3	·00162 5·8	·015 1899	1185
Aug.	31	127	·09563 °95615	05 44·3 3442·1	+ 0·00161 + 5·8	1·015 0714	- 1217
	1	128	·05178 °95642	03 06·4 3443·1	·00161 5·8	·014 9497	1250
	2	129	·00820 °95672	00 29·5 3444·2	·00161 5·8	·014 8247	1282
	3	129	·96492 °95702	57 53·7 3445·3	·00162 5·8	·014 6965	1317
	4	130	·92194 °95734	55 19·0 3446·4	·00162 5·8	·014 5648	1353
	5	131	·87928 °95768	52 45·4 3447·7	+ 0·00162 + 5·8	1·014 4295	- 1391
	6	132	·83696 °95804	50 13·1 3448·9	·00162 5·8	·014 2904	1430
	7	133	·79500 °95840	47 42·0 3450·2	·00162 5·8	·014 1474	1471
	8	134	·75340 °95876	45 12·2 3451·6	·00161 5·8	·014 0003	1515
	9	135	·71216 °95913	42 43·8 3452·9	·00159 5·7	·013 8488	1561
	10	136	·67129 °95951	40 16·7 3454·2	+ 0·00157 + 5·6	1·013 6927	- 1610
	11	137	·63080 °95988	37 50·9 3455·6	·00153 5·5	·013 5317	1660
	12	138	·59068 °96024	35 26·5 3456·8	·00149 5·4	·013 3657	1713
	13	139	·55092 °96059	33 03·3 3458·1	·00144 5·2	·013 1944	1767
	14	140	·51151 °96093	30 41·4 3459·4	·00138 5·0	·013 0177	1820
	15	141	·47244 °96125	28 20·8 3460·5	+ 0·00131 + 4·7	1·012 8357	- 1872
	16	142	·43369	26 01·3	+ 0·00124 + 4·5	1·012 6485	

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MEAN EQUINOX OF 1950.0.

Date.		Longitude.				Latitude.		Radius Vector.	
Aug.	16	I42	°43369	0°96156	26 01.3	3461.6	+ 0°00124	+ 4.5	I·012 6485 —1922
	17	I43	°39525	°96185	23 42.9	3462.7	°00117	4.2	°012 4563 1971
	18	I44	°35710	°96215	21 25.6	3463.7	°00109	3.9	°012 2592 2015
	19	I45	°31925	°96245	19 09.3	3464.8	°00102	3.7	°012 0577 2054
	20	I46	°28170	°96274	16 54.1	3465.9	°00095	3.4	°011 8523 2091
	21	I47	°24444	0°96304	14 40.0	3466.9	+ 0°00089	+ 3.2	I·011 6432 —2123
	22	I48	°20748	°96335	12 26.9	3468.1	°00084	3.0	°011 4309 2152
	23	I49	°17083	°96370	10 15.0	3469.3	°00079	2.8	°011 2157 2178
	24	I50	°13453	°96404	08 04.3	3470.6	°00075	2.7	°010 9979 2200
	25	I51	°09857	°96442	05 54.9	3471.9	°00072	2.6	°010 7779 2221
	26	I52	°06299	0°96481	03 46.8	3473.3	+ 0°00070	+ 2.5	I·010 5558 —2241
	27	I53	°02780	°96522	01 40.1	3474.8	°00068	2.4	°010 3317 2259
	28	I53	°99302	°96565	59 34.9	3476.3	°00067	2.4	°010 1058 2276
	29	I54	°95867	°96610	57 31.2	3478.0	°00066	2.4	°009 8782 2293
	30	I55	°92477	°96657	55 29.2	3479.6	°00065	2.3	°009 6489 2310
Sept.	31	I56	°89134	0°96706	53 28.8	3481.4	+ 0°00065	+ 2.3	I·009 4179 —2327
	1	I57	°85840	°96756	51 30.2	3483.3	°00064	2.3	°009 1852 2346
	2	I58	°82596	°96808	49 33.5	3485.1	°00064	2.3	°008 9506 2365
	3	I59	°79404	°96862	47 38.6	3487.0	°00063	2.3	°008 7141 2386
	4	I60	°76266	°96915	45 45.6	3488.9	°00061	2.2	°008 4755 2407
	5	I61	°73181	0°96971	43 54.5	3491.0	+ 0°00059	+ 2.1	I·008 2348 —2430
	6	I62	°70152	°97027	42 05.5	3493.0	°00056	2.0	°007 9918 2456
	7	I63	°67179	°97084	40 18.5	3495.0	°00052	1.9	°007 7462 2484
	8	I64	°64263	°97140	38 33.5	3497.0	°00048	1.7	°007 4978 2515
	9	I65	°61403	°97196	36 50.5	3499.1	°00042	1.5	°007 2463 2547
	10	I66	°58599	0°97251	35 09.6	3501.0	+ 0°00035	+ 1.3	I·006 9916 —2581
	11	I67	°55850	°97304	33 30.6	3502.9	°00028	1.0	°006 7335 2616
	12	I68	°53154	°97355	31 53.5	3504.8	°00021	0.7	°006 4719 2653
	13	I69	°50509	°97405	30 18.3	3506.6	°00013	0.5	°006 2066 2688
	14	I70	°47914	°97453	28 44.9	3508.3	+ 0°00005	+ 0.2	°005 9378 2719
	15	I71	°45367	0°97499	27 13.2	3510.0	— 0°00003	— 0.1	I·005 6659 —2749
	16	I72	°42866	°97545	25 43.2	3511.6	°00011	0.4	°005 3910 2774
	17	I73	°40411	°97590	24 14.8	3513.2	°00018	0.6	°005 1136 2797
	18	I74	°38001	°97634	22 48.0	3514.9	°00024	0.9	°004 8339 2814
	19	I75	°35635	°97679	21 22.9	3516.4	°00029	1.1	°004 5525 2828
	20	I76	°33314	0°97726	19 59.3	3518.1	— 0°00034	— 1.2	I·004 2697 —2838
	21	I77	°31040	°97773	18 37.4	3519.9	°00038	1.4	°003 9859 2843
	22	I78	°28813	°97821	17 17.3	3521.5	°00041	1.5	°003 7016 2848
	23	I79	°26634	°97871	15 58.8	3523.4	°00043	1.5	°003 4168 2849
	24	I80	°24505	°97923	14 42.2	3525.2	°00044	1.6	°003 1319 2848
	25	I81	°22428	0°97975	13 27.4	3527.1	— 0°00045	— 1.6	I·002 8471 —2845
	26	I82	°20403	°98029	12 14.5	3529.1	°00046	1.7	°002 5626 2843
	27	I83	°18432	°98086	11 03.6	3531.0	°00046	1.7	°002 2783 2838
	28	I84	°16518	°98142	09 54.6	3533.1	°00047	1.7	°001 9945 2832
	29	I85	°14660	°98201	08 47.7	3535.3	°00047	1.7	°001 7113 2827
Oct.	30	I86	°12861	0°98262	07 43.0	3537.4	— 0°00048	— 1.7	I·001 4286 —2822
	1	I87	°11123		06 40.4		— 0°00049	— 1.8	I·001 1464

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Date.		Longitude.				Latitude.		Radius Vector.	
Oct.	1	187	111123	06 40.4	3539.7	- 0.00049	- 1.8	1.001 1464	-2817
	2	188	09446	05 40.1	3541.9	0.00051	1.9	0.000 8647	2814
	3	189	07832	04 42.0	3544.1	0.00054	2.0	0.000 5833	2811
	4	190	06281	03 46.1	3546.5	0.00058	2.1	0.000 3022	2811
	5	191	04795	02 52.6	3548.9	0.00062	2.2	1.000 0211	2812
	6	192	03374	02 01.5	3551.1	- 0.00067	- 2.4	0.999 7399	-2815
	7	193	02018	01 12.6	3553.5	0.00073	2.6	0.999 4584	2822
	8	194	00726	00 26.1	3555.8	0.00079	2.9	0.999 1762	2829
	9	194	99499	59 41.9	3558.1	0.00087	3.1	0.998 8933	2840
	10	195	98333	59 00.0	3560.2	0.00094	3.4	0.998 6093	2851
	11	196	97227	58 20.2	3562.3	- 0.00102	- 3.7	0.998 3242	-2863
	12	197	96180	57 42.5	3564.3	0.00110	4.0	0.998 0379	2874
	13	198	95188	57 06.8	3566.2	0.00117	4.2	0.997 7505	2882
	14	199	94250	56 33.0	3568.1	0.00124	4.5	0.997 4623	2889
	15	200	93364	56 01.1	3569.9	0.00130	4.7	0.997 1734	2892
	16	201	92527	55 31.0	3571.6	- 0.00135	- 4.9	0.996 8842	-2891
	17	202	91740	55 02.6	3573.4	0.00139	5.0	0.996 5951	2885
	18	203	91000	54 36.0	3575.1	0.00143	5.1	0.996 3066	2876
	19	204	90309	54 11.1	3576.9	0.00145	5.2	0.996 0190	2863
	20	205	89666	53 48.0	3578.5	0.00147	5.3	0.995 7327	2846
	21	206	89071	53 26.5	3580.4	- 0.00148	- 5.3	0.995 4481	-2828
	22	207	88525	53 06.9	3582.2	0.00149	5.4	0.995 1653	2806
	23	208	88029	52 49.1	3583.9	0.00149	5.4	0.994 8847	2781
	24	209	87584	52 33.0	3585.9	0.00149	5.4	0.994 6066	2756
	25	210	87191	52 18.9	3587.7	0.00149	5.4	0.994 3310	2728
	26	211	86850	52 06.6	3589.7	- 0.00148	- 5.3	0.994 0582	-2699
	27	212	86563	51 56.3	3591.6	0.00148	5.3	0.993 7883	2668
	28	213	86329	51 47.9	3593.6	0.00149	5.4	0.993 5215	2638
	29	214	86152	51 41.5	3595.6	0.00150	5.4	0.993 2577	2607
	30	215	86032	51 37.1	3597.8	0.00151	5.4	0.992 9970	2577
Nov.	31	216	85969	51 34.9	3599.8	- 0.00154	- 5.5	0.992 7393	-2547
	1	217	85964	51 34.7	3602.0	0.00157	5.6	0.992 4846	2519
	2	218	86019	51 36.7	3604.1	0.00160	5.8	0.992 2327	2492
	3	219	86134	51 40.8	3606.3	0.00165	5.9	0.991 9835	2469
	4	220	86309	51 47.1	3608.4	0.00171	6.1	0.991 7366	2446
	5	221	86543	51 55.5	3610.6	- 0.00176	- 6.3	0.991 4920	-2426
	6	222	86836	52 06.1	3612.6	0.00183	6.6	0.991 2494	2410
	7	223	87186	52 18.7	3614.6	0.00189	6.8	0.991 0084	2395
	8	224	87592	52 33.3	3616.5	0.00195	7.0	0.990 7689	2382
	9	225	88051	52 49.8	3618.4	0.00201	7.2	0.990 5307	2369
	10	226	88561	53 08.2	3620.1	- 0.00207	- 7.4	0.990 2938	-2356
	11	227	89119	53 28.3	3621.7	0.00212	7.6	0.990 0582	2341
	12	228	89723	53 50.0	3623.3	0.00216	7.8	0.989 8241	2325
	13	229	90368	54 13.3	3624.7	0.00220	7.9	0.989 5916	2305
	14	230	91054	54 38.0	3626.1	0.00222	8.0	0.989 3611	2281
	15	231	91780	55 04.1	3627.4	- 0.00223	- 8.0	0.989 1330	-2255
	16	232	92543	55 31.5	3627.4	- 0.00224	- 8.0	0.988 9075	-2255

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MEAN EQUINOX OF 1950.0.

Date.		Longitude.				Latitude.		Radius Vector.		
Nov.	16	232	°92543	1°00800	55 31°5	3628°8	— 0°00224	— 8°0	0°988 9075	—2224
	17	233	°93343	°00835	56 00°3	3630°1	°00224	8°0	°988 6851	2191
	18	234	°94178	°00871	56 30°4	3631°4	°00223	8°0	°988 4660	2154
	19	235	°95049	°00907	57 01°8	3632°6	°00221	8°0	°988 2506	2114
	20	236	°95956	°00942	57 34°4	3633°9	°00220	7°9	°988 0392	2072
	21	237	°96898	1°00978	58 08°3	3635°2	— 0°00218	— 7°9	0°987 8320	—2027
	22	238	°97876	°01014	58 43°5	3636°5	°00216	7°8	°987 6293	1981
	23	239	°98890	°01050	59 20°0	3637°8	°00215	7°7	°987 4312	1931
	24	240	°99940	°01087	59 57°8	3639°2	°00214	7°7	°987 2381	1882
	25	242	°01027	°01125	00 37°0	3640°5	°00213	7°7	°987 0499	1830
	26	243	°02152	1°01163	01 17°5	3641°8	— 0°00213	— 7°7	0°986 8669	—1777
	27	244	°03315	°01202	01 59°3	3643°3	°00213	7°7	°986 6892	1725
	28	245	°04517	°01241	02 42°6	3644°7	°00214	7°7	°986 5167	1672
	29	246	°05758	°01282	03 27°3	3646°2	°00216	7°8	°986 3495	1621
	30	247	°07040	°01323	04 13°5	3647°6	°00219	7°9	°986 1874	1572
Dec.	1	248	°08363	1°01365	05 01°1	3649°1	— 0°00223	— 8°0	0°986 0302	—1524
	2	249	°09728	°01405	05 50°2	3650°6	°00226	8°1	°985 8778	1479
	3	250	°11133	°01445	06 40°8	3652°0	°00231	8°3	°985 7299	1438
	4	251	°12578	°01483	07 32°8	3653°4	°00235	8°5	°985 5861	1398
	5	252	°14061	°01522	08 26°2	3654°8	°00240	8°6	°985 4463	1361
	6	253	°15583	1°01556	09 21°0	3656°0	— 0°00244	— 8°8	0°985 3102	—1328
	7	254	°17139	°01590	10 17°0	3657°2	°00248	8°9	°985 1774	1295
	8	255	°18729	°01619	11 14°2	3658°3	°00251	9°0	°985 0479	1264
	9	256	°20348	°01646	12 12°5	3659°3	°00254	9°1	°984 9215	1233
	10	257	°21994	°01670	13 11°8	3660°1	°00255	9°2	°984 7982	1201
	11	258	°23664	1°01692	14 11°9	3660°9	— 0°00256	— 9°2	0°984 6781	—1169
	12	259	°25356	°01710	15 12°8	3661°6	°00255	9°2	°984 5612	1133
	13	260	°27066	°01725	16 14°4	3662°1	°00254	9°1	°984 4479	1095
	14	261	°28791	°01741	17 16°5	3662°7	°00252	9°1	°984 3384	1055
	15	262	°30532	°01753	18 19°2	3663°1	°00249	9°0	°984 2329	1011
	16	263	°32285	1°01766	19 22°3	3663°5	— 0°00246	— 8°9	0°984 1318	— 965
	17	264	°34051	°01776	20 25°8	3664°0	°00243	8°7	°984 0353	916
	18	265	°35827	°01786	21 29°8	3664°3	°00239	8°6	°983 9437	864
	19	266	°37613	°01795	22 34°1	3664°6	°00236	8°5	°983 8573	810
	20	267	°39408	°01805	23 38°7	3665°0	°00232	8°4	°983 7763	755
	21	268	°41213	1°01813	24 43°7	3665°2	— 0°00229	— 8°2	0°983 7008	— 696
	22	269	°43026	°01821	25 48°9	3665°6	°00226	8°1	°983 6312	635
	23	270	°44847	°01831	26 54°5	3665°9	°00224	8°1	°983 5677	574
	24	271	°46678	°01841	28 00°4	3666°3	°00222	8°0	°983 5103	510
	25	272	°48519	°01850	29 06°7	3666°6	°00221	8°0	°983 4593	446
	26	273	°50369	1°01860	30 13°3	3667°0	— 0°00221	— 8°0	0°983 4147	— 382
	27	274	°52229	°01873	31 20°3	3667°4	°00222	8°0	°983 3765	318
	28	275	°54102	°01884	32 27°7	3667°8	°00223	8°0	°983 3447	255
	29	276	°55986	°01897	33 35°5	3668°3	°00225	8°1	°983 3192	195
	30	277	°57883	°01910	34 43°8	3668°7	°00228	8°2	°983 2997	138
	31	278	°59793	1°01921	35 52°5	3669°2	— 0°00230	— 8°3	0°983 2859	— 83
	32	279	°61714		37 01°7		— 0°00233	— 8°4	0°983 2776	

Date.		MEAN EQUINOX OF 1950-0.								
		X			Y			Z		
Jan.	1	+0.1687665	+171972	535	-0.8886772	+29050	+2755	-0.3854504	+12605	+1193
	2	.1859637	171387	585	.8857722	31792	2742	.3841899	13795	1190
	3	.2031024	170752	635	.8825930	34525	2733	.3828104	14978	1183
	4	.2201776	170069	683	.8791405	37246	2721	.3813126	16157	1179
	5	.2371845	169336	733	.8754159	39956	2710	.3796969	17331	1174
	6	+0.2541181	+168557	-779	-0.8714203	+42655	+2699	-0.3779638	+18499	+1168
	7	.2709738	167727	830	.8671548	45344	2689	.3761139	19665	1166
	8	.2877465	166847	880	.8626204	48022	2678	.3741474	20825	1160
	9	.3044312	165917	930	.8578182	50688	2666	.3720649	21980	1155
	10	.3210229	164937	980	.8527494	53343	2655	.3698669	23131	1151
	11	+0.3375166	+163902	-1035	-0.8474151	+55984	+2641	-0.3675538	+24276	+1145
	12	.3539068	162817	1085	.8418167	58611	2627	.3651262	25416	1140
	13	.3701885	161678	1139	.8359556	61221	2610	.3625846	26549	1133
	14	.3863563	160485	1193	.8298335	63813	2592	.3599297	27675	1126
	15	.4024048	159239	1246	.8234522	66387	2574	.3571622	28792	1117
	16	+0.4183287	+157940	-1299	-0.8168135	+68940	+2553	-0.3542830	+29900	+1108
	17	.4341227	156590	1350	.8099195	71471	2531	.3512930	31000	1100
	18	.4497817	155188	1402	.8027724	73978	2507	.3481930	32088	1088
	19	.4653005	153734	1454	.7953746	76460	2482	.3449842	33166	1078
	20	.4806739	152231	1503	.7877286	78916	2456	.3416676	34233	1067
	21	+0.4958970	+150680	-1551	-0.7798370	+81344	+2428	-0.3382443	+35288	+1055
	22	.5109650	149081	1599	.7717026	83745	2401	.3347155	36330	1042
	23	.5258731	147434	1647	.7633281	86116	2371	.3310825	37358	1028
	24	.5406165	145742	1692	.7547165	88456	2340	.3273467	38374	1016
	25	.5551907	144006	1736	.7458709	90767	2311	.3235093	39377	1003
	26	+0.5695913	+142226	-1780	-0.7367942	+93046	+2279	-0.3195716	+40364	+987
	27	.5838139	140404	1822	.7274896	95292	2246	.3155352	41338	974
	28	.5978543	138541	1863	.7179604	97505	2213	.3114014	42298	960
	29	.6117084	136640	1901	.7082099	99685	2180	.3071716	43242	944
	30	.6253724	134699	1941	.6982414	101832	2147	.3028474	44172	930
Feb.	31	+0.6388423	+132722	-1977	-0.6880582	+103946	+2114	-0.2984302	+45087	+915
	1	.6521145	130709	2013	.6776636	106026	2080	.2939215	45987	900
	2	.6651854	128662	2047	.6670610	108074	2048	.2893228	46874	887
	3	.6780516	126580	2082	.6562536	110091	2017	.2846354	47748	874
	4	.6907096	124461	2119	.6452445	112076	1985	.2798606	48607	859
	5	+0.7031557	+122307	-2154	-0.6340369	+114028	+1952	-0.2749999	+49453	+846
	6	.7153864	120118	2189	.6226341	115950	1922	.2700546	50286	833
	7	.7273982	117893	2225	.6110391	117838	1888	.2650260	51105	819
	8	.7391875	115629	2264	.5992553	119693	1855	.2599155	51909	804
	9	.7507504	113329	2300	.5872860	121512	1819	.2547246	52698	789
	10	+0.7620833	+110992	-2337	-0.5751348	+123295	+1783	-0.2494548	+53474	+776
	11	.7731825	108619	2373	.5628053	125041	1746	.2441074	54232	758
	12	.7840444	106210	2409	.5503012	126747	1706	.2386842	54973	741
	13	.7946654	103766	2444	.5376265	128413	1666	.2331869	55697	724
	14	.8050420	101289	2477	.5247852	130038	1625	.2276172	56403	706
	15	+0.8151709	+98780	-2509	-0.5117814	+131621	+1583	-0.2219769	+57092	+689
	16	.8250489	98780	2542	.4986193	133241	1541	.2162677	57902	669

Date.		MEAN EQUINOX OF 1950.0.					
		X		Y		Z	
Feb.	16	+0.8250489	+ 96238 -2542	-0.4986193	+133162 +1541	-0.2162677	+ 57761 + 669
	17	.8346727	+ 96238 2572	.4853031	+133162 1495	.2104916	+ 57761 650
	18	.8440393	93666 2599	.4718374	134657 1452	.2046505	58411 631
	19	.8531460	91067 2627	.4582265	136109 1407	.1987463	59042 610
	20	.8619900	88440 2653	.4444749	137516 1361	.1927811	59652 591
			85787		138877		60243
	21	+0.8705687	+ 83110 -2677	-0.4305872	+140192 +1315	-0.1867568	+ 60813 + 570
	22	.8788797	+ 83110 2700	.4165680	+140192 1268	.1806755	+ 60813 551
	23	.8869207	80410 2722	.4024220	141460 1222	.1745391	61364 529
	24	.8946895	77688 2743	.3881538	142682 1175	.1683498	61893 509
	25	.9021840	74945 2761	.3737681	143857 1128	.1621096	62402 488
			72184		144985		62890
	26	+0.9094024	+ 69406 -2778	-0.3592696	+146066 +1081	-0.1558206	+ 63358 + 468
	27	.9163430	+ 69406 2793	.3446630	+146066 1035	.1494848	+ 63358 447
	28	.9230043	66613 2806	.3299529	147101 990	.1431043	63805 428
Mar.	1	.9293850	63807 2821	.3151438	148091 943	.1366810	64233 407
	2	.9354836	60986 2833	.3002404	149034 900	.1302170	64640 388
			58153		149934		65028
	3	+0.9412989	+ 55309 -2844	-0.2852470	+150790 + 856	-0.1237142	+ 65399 + 371
	4	.9468298	+ 55309 2856	.2701680	+150790 814	.1171743	+ 65399 351
	5	.9520751	52453 2870	.2550076	151604 771	.1105993	65750 334
	6	.9570334	49583 2882	.2397701	152375 729	.1039909	66084 316
	7	.9617035	46701 2895	.2244597	153104 685	.0973509	66400 297
			43806		153789		66697
	8	+0.9660841	+ 40898 -2908	-0.2090808	+154432 + 643	-0.0906812	+ 66976 + 279
	9	.9701739	+ 40898 2922	.1936376	+154432 597	.0839836	+ 66976 261
	10	.9739715	37976 2936	.1781347	155029 551	.0772599	67237 240
	11	.9774755	35040 2946	.1625767	155580 505	.0705122	67477 220
	12	.9806849	32094 2958	.1469682	156085 457	.0637425	67697 200
			29136		156542		67897
	13	+0.9835985	+ 26170 -2966	-0.1313140	+156951 + 409	-0.0569528	+ 68076 + 179
	14	.9862155	+ 26170 2976	.1156189	+156951 360	.0501452	+ 68076 157
	15	.9885349	23194 2983	.0998878	157311 312	.0433219	68233 137
	16	.9905560	20211 2989	.0841255	157623 260	.0364849	68370 115
	17	.9922782	17222 2993	.0683372	157883 212	.0296364	68485 92
			14229		158095		68577
	18	+0.9937011	+ 11234 -2995	-0.0525277	+158256 + 161	-0.0227787	+ 68648 + 71
	19	.9948245	+ 11234 2997	.0367021	+158256 112	.0159139	+ 68648 49
	20	.9956482	8237 2998	.0208653	158368 61	.0090442	68697 26
	21	.9961721	5239 2996	.0050224	158429 11	.0021719	68723 5
	22	.9963964	+ 2243 2993	+ .0108216	158440 - 39	+ .0047009	68728 - 17
			750		158401		68711
	23	+0.9963214	+ 3738 -2988	+0.0266617	+158312 - 89	+0.0115720	+ 68672 - 39
	24	.9959476	+ 3738 2984	.0424929	+158312 139	.0184392	+ 68672 62
	25	.9952754	6722 2975	.0583102	158173 186	.0253002	68610 82
	26	.9943057	9697 2966	.0741089	157987 235	.0321530	68528 104
	27	.9930394	12663 2956	.0898841	157752 284	.0389954	68424 123
			15619		157468		68301
	28	+0.9914775	+ 18565 -2946	+0.1056309	+157140 - 328	+0.0458255	+ 68155 - 146
	29	.9896210	+ 18565 2933	.1213449	+157140 375	.0526410	+ 68155 163
	30	.9874712	21498 2921	.1370214	156765 417	.0594402	67992 183
	31	.9850293	24419 2907	.1526562	156348 461	.0662211	67809 202
Apr.	1	.9822967	27326 2895	.1682449	155887 504	.0729818	67607 218
			30221		155383		67389
	2	+0.9792746	+ 33104 -2883	+0.1837832	+154838 - 545	+0.0797207	+ 67152 - 237
	3	+0.9759642	+ 33104 -2871	+0.1992670	+154838 - 584	+0.0864359	+ 67152 - 254

Date.		MEAN EQUINOX OF 1950.0.								
		X			Y			Z		
Apr.	1	+0.9822967	-30221	-2895	+0.1682449	+155383	-504	+0.0729818	+67389	-218
	2	.9792746	33104	2883	.1837832	154838	545	.0797207	67152	237
	3	.9759642	35975	2871	.1992670	154254	584	.0864359	66898	254
	4	.9723667	38835	2860	.2146924	153627	627	.0931257	66626	272
	5	.9684832	41685	2850	.2300551	152958	669	.0997883	66337	289
	6	+0.9643147	-44523	-2838	+0.2453509	+152247	-711	+0.1064220	+66030	-307
	7	.9598624	47350	2827	.2605756	151492	755	.1130250	65704	326
	8	.9551274	50164	2814	.2757248	150694	798	.1195954	65360	344
	9	.9501110	52964	2800	.2907942	149851	843	.1261314	64995	365
	10	.9448146	55750	2786	.3057793	148965	886	.1326309	64612	383
	11	+0.9392396	-58520	-2770	+0.3206758	+148033	-932	+0.1390921	+64210	-402
	12	.9333876	61272	2752	.3354791	147056	977	.1455131	63788	422
	13	.9272604	64005	2733	.3501847	146035	1021	.1518919	63345	443
	14	.9208599	66720	2715	.3647882	144971	1064	.1582264	62885	460
	15	.9141879	69412	2692	.3792853	143861	1110	.1645149	62404	481
	16	+0.9072467	-72083	-2671	+0.3936714	+142708	-1153	+0.1707553	+61905	-499
	17	.9000384	74730	2647	.4079422	141512	1196	.1769458	61385	520
	18	.8925654	77352	2622	.4220934	140272	1240	.1830843	60847	538
	19	.8848302	79947	2595	.4361206	138990	1282	.1891690	60291	556
	20	.8768355	82516	2569	.4500196	137666	1324	.1951981	59716	575
	21	+0.8685839	-85055	-2539	+0.4637862	+136302	-1364	+0.2011697	+59122	-594
	22	.8600784	87563	2508	.4774164	134897	1405	.2070819	58511	611
	23	.8513221	90042	2479	.4909061	133453	1444	.2129330	57884	627
	24	.8423179	92487	2445	.5042514	131972	1481	.2187214	57240	644
	25	.8330692	94900	2413	.5174486	130456	1516	.2244454	56580	660
	26	+0.8235792	-97280	-2380	+0.5304942	+128903	-1553	+0.2301034	+55905	-675
	27	.8138512	99627	2347	.5433845	127318	1585	.2356939	55216	689
	28	.8038885	101941	2314	.5561163	125699	1619	.2412155	54514	702
	29	.7936944	104222	2281	.5686862	124051	1648	.2466669	53797	717
	30	.7832722	106472	2250	.5810913	122371	1680	.2520466	53069	728
May	1	+0.7726250	-108690	-2218	+0.5933284	+120662	-1709	+0.2573535	+52327	-742
	2	.7617560	110878	2188	.6053946	118921	1741	.2625862	51573	754
	3	.7506682	113035	2157	.6172867	117151	1770	.2677435	50807	766
	4	.7393647	115161	2126	.6290018	115350	1801	.2728242	50027	780
	5	.7278486	117259	2098	.6405368	113517	1833	.2778269	49234	793
	6	+0.7161227	-119323	-2064	+0.6518885	+111653	-1864	+0.2827503	+48426	-808
	7	.7041904	121357	2034	.6630538	109757	1896	.2875929	47606	820
	8	.6920547	123355	1998	.6740295	107828	1929	.2923535	46771	835
	9	.6797192	125321	1966	.6848123	105869	1959	.2970306	45922	849
	10	.6671871	127250	1929	.6953992	103879	1990	.3016228	45059	863
	11	+0.6544621	-129143	-1893	+0.7057871	+101857	-2022	+0.3061287	+44184	-875
	12	.6415478	130998	1855	.7159728	99805	2052	.3105471	43295	889
	13	.6284480	132815	1817	.7259533	97723	2082	.3148766	42392	903
	14	.6151665	134593	1778	.7357256	95613	2110	.3191158	41477	915
	15	.6017072	136330	1737	.7452869	93472	2141	.3232635	40548	929
	16	+0.5880742	-138026	-1696	+0.7546341	+91304	-2168	+0.3273183	+39607	-941
	17	.5742716	139806	1653	.7637645	89163	2194	.3312790	38697	953

Date.		MEAN EQUINOX OF 1950.0.											
		X				Y				Z			
May	17	+0.5742716	-139679	-1653		+0.7637645	+ 89110	-2194		+0.3312790	+ 38654	- 953	
	18	.5603037	141289	1610		.7726755	86888	2222		.3351444	37690	964	
	19	.5461748	142854	1565		.7813643	84642	2246		.3389134	36715	975	
	20	.5318894	144373	1519		.7898285	82373	2269		.3425849	35728	987	
	21	.5174521	145847	1474		.7980658	80080	2293		.3461577	34732	996	
	22	+0.5028674	-147273	-1426		+0.8060738	+ 77768	-2312		+0.3496309	+ 33728	-1004	
	23	.4881401	148655	1382		.8138506	75436	2332		.3530037	32715	1013	
	24	.4732746	149990	1335		.8213942	73087	2349		.3562752	31694	1021	
	25	.4582756	151279	1289		.8287029	70720	2367		.3594446	30666	1028	
	26	.4431477	152522	1243		.8357749	68340	2380		.3625112	29633	1033	
	27	+0.4278955	-153721	-1199		+0.8426089	+ 65944	-2396		+0.3654745	+ 28594	-1039	
	28	.4125234	154878	1157		.8492033	63534	2410		.3683339	27549	1045	
	29	.3970356	155991	1113		.8555567	61111	2423		.3710888	26498	1051	
	30	.3814365	157062	1071		.8616678	58675	2436		.3737386	25444	1054	
	31	.3657303	158092	1030		.8675353	56226	2449		.3762830	24382	1062	
June	1	+0.3499211	-159080	- 988		+0.8731579	+ 53762	-2464		+0.3787212	+ 23315	-1067	
	2	.3340131	160028	948		.8785341	51286	2476		.3810527	22242	1073	
	3	.3180103	160933	905		.8836627	48794	2492		.3832769	21163	1079	
	4	.3019170	161795	862		.8885421	46288	2506		.3853932	20078	1085	
	5	.2857375	162614	819		.8931709	43769	2519		.3874010	18986	1092	
	6	+0.2694761	-163389	- 775		+0.8975478	+ 41236	-2533		+0.3892996	+ 17890	-1096	
	7	.2531372	164118	729		.9016714	38690	2546		.3910886	16785	1105	
	8	.2367254	164803	685		.9055404	36131	2559		.3927671	15676	1109	
	9	.2202451	165440	637		.9091535	33561	2570		.3943347	14562	1114	
	10	.2037011	166030	590		.9125096	30980	2581		.3957909	13442	1120	
	11	+0.1870981	-166574	- 544		+0.9156076	+ 28387	-2593		+0.3971351	+ 12318	-1124	
	12	.1704407	167068	494		.9184463	25785	2602		.3983669	11189	1129	
	13	.1537339	167514	446		.9210248	23174	2611		.3994858	10056	1133	
	14	.1369825	167910	396		.9233422	20556	2618		.4004914	8919	1137	
	15	.1201915	168255	345		.9253978	17929	2627		.4013833	7778	1141	
	16	+0.1033660	-168549	- 294		+0.9271907	+ 15298	-2631		+0.4021611	+ 6635	-1143	
	17	.0865111	168790	241		.9287205	12663	2635		.4028246	5491	1144	
	18	.0696321	168981	191		.9299868	10024	2639		.4033737	4346	1145	
	19	.0527340	169120	139		.9309892	7387	2637		.4038083	3200	1146	
	20	.0358220	169208	88		.9317279	4750	2637		.4041283	2054	1146	
	21	+0.0189012	-169245	- 37		+0.9322029	+ 2115	-2635		+0.4043337	+ 910	-1144	
	22	.0019767	169234	11		.9324144	516	2631		.4044247	791	1143	
	23	-.0149467	169174	60		.9323628	3144	2628		.4044014	672	1139	
	24	.0318641	169067	107		.9320484	5766	2622		.4042642	5509	1137	
	25	.0487708	168915	152		.9314718	8383	2617		.4040133	4363	1134	
	26	-0.0656623	-168717	+ 198		+0.9306335	+ 10994	-2611		+0.4036490	+ 4776	-1133	
	27	.0825340	168475	242		.9295341	13600	2606		.4031714	5904	1128	
	28	.0993815	168190	285		.9281741	16200	2600		.4025810	7031	1127	
	29	.1162005	167859	331		.9265541	18794	2594		.4018779	8155	1124	
	30	.1329864	167488	371		.9246747	21385	2591		.4010624	9276	1121	
July	1	-0.1497352	-167072	+ 416		+0.9225362	+ 23969	-2584		+0.4001348	+ 10395	-1119	
	2	-0.1664424	-167072	+ 460		+0.9201393	+ 23969	-2579		+0.3990953	+ 10395	-1118	

		MEAN EQUINOX OF 1950.0.											
Date.		X				Y				Z			
July	1	-0.1497352	-167072	+ 416	+0.9225362	-23969	-2584	+0.4001348	10395	-1119			
	2	.1664424	166612	460	.9201393	26548	2579	.3990953	11513	1118			
	3	.1831036	166107	505	.9174845	29122	2574	.3979440	12628	1115			
	4	.1997143	165558	549	.9145723	31691	2569	.3966812	13741	1113			
	5	.2162701	164963	595	.9114032	34252	2561	.3953071	14852	1111			
	6	-0.2327664	-164321	+ 642	+0.9079780	-36806	-2554	+0.3938219	-15959	-1107			
	7	.2491985	163635	686	.9042974	39354	2548	.3922260	17064	1105			
	8	.2655620	162902	733	.9003620	41892	2538	.3905196	18164	1100			
	9	.2818522	162121	781	.8961728	44421	2529	.3887032	19263	1099			
	10	.2980643	161294	827	.8917307	46941	2520	.3867769	20355	1092			
	11	-0.3141937	-160419	+ 875	+0.8870366	-49449	-2508	+0.3847414	-21445	-1090			
	12	.3302356	159496	923	.8820917	51946	2497	.3825969	22529	1084			
	13	.3461852	158526	970	.8768971	54431	2485	.3803440	23609	1080			
	14	.3620378	157504	1022	.8714540	56901	2470	.3779831	24681	1072			
	15	.3777882	156435	1069	.8657639	59355	2454	.3755150	25747	1066			
	16	-0.3934317	-155319	+1116	+0.8598284	-61791	-2436	+0.3729403	-26805	-1058			
	17	.4089636	154153	1166	.8536493	64208	2417	.3702598	27855	1050			
	18	.4243789	152942	1211	.8472285	66604	2396	.3674743	28897	1042			
	19	.4396731	151685	1257	.8405681	68979	2375	.3645846	29926	1029			
	20	.4548416	150384	1301	.8336702	71331	2352	.3615920	30947	1021			
	21	-0.4698800	-149042	+1342	+0.8265371	-73658	-2327	+0.3584973	-31957	-1010			
	22	.4847842	147659	1383	.8191713	75963	2305	.3553016	32955	998			
	23	.4995501	146235	1424	.8115750	78243	2280	.3520061	33944	989			
	24	.5141736	144774	1461	.8037507	80499	2256	.3486117	34921	977			
	25	.5286510	143275	1499	.7957008	82733	2234	.3451196	35889	968			
	26	-0.5429785	-141737	+1538	+0.7874275	-84943	-2210	+0.3415307	-36845	-956			
	27	.5571522	140164	1573	.7789332	87130	2187	.3378462	37792	947			
	28	.5711686	138555	1609	.7702202	89293	2163	.3340670	38729	937			
	29	.5850241	136908	1647	.7612909	91433	2140	.3301941	39656	927			
	30	.5987149	135225	1683	.7521476	93550	2117	.3262285	40572	916			
	31	-0.6122374	-133506	+1719	+0.7427926	-95643	-2093	+0.3221713	-41480	-908			
Aug.	1	.6255880	131748	1758	.7332283	97714	2071	.3180233	42378	898			
	2	.6387628	129955	1793	.7234569	99759	2045	.3137855	43263	885			
	3	.6517583	128123	1832	.7134810	101780	2021	.3094592	44140	877			
	4	.6645706	126254	1869	.7033030	103775	1995	.3050452	45006	866			
	5	-0.6771960	-124348	+1906	+0.6929255	-105744	-1969	+0.3005446	-45860	-854			
	6	.6896308	122406	1942	.6823511	107688	1944	.2959586	46703	843			
	7	.7018714	120425	1981	.6715823	109602	1914	.2912883	47536	833			
	8	.7139139	118406	2019	.6606221	111489	1887	.2865347	48354	818			
	9	.7257545	116350	2056	.6494732	113347	1858	.2816993	49162	808			
	10	-0.7373895	-114257	+2093	+0.6381385	-115174	-1827	+0.2767831	-49956	-794			
	11	.7488152	112126	2131	.6266211	116971	1797	.2717875	50737	781			
	12	.7600278	109958	2168	.6149240	118734	1763	.2667138	51503	766			
	13	.7710236	107752	2206	.6030506	120461	1727	.2615635	52254	751			
	14	.7817988	105513	2239	.5910045	122153	1692	.2563381	52990	736			
	15	-0.7923501	-103240	+2273	+0.5787892	-123808	-1655	+0.2510391	-53708	-718			
	16	-0.8026741	-101320	+2306	+0.5664084	-125380	-1617	+0.2456683	-54508	-701			

SUN'S CO-ORDINATES, 1931.

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Date.		MEAN EQUINOX OF 1950-0.											
		X				Y				Z			
Aug. 16		-0.8026741	-100934	+2306	+0.5664084	-125425	-1617	+0.2456683	-54409	-701			
17		.8127675	98598	2336	.5538659	127001	1576	.2402274	55093	684			
18		.8226273	96235	2363	.5411658	128539	1500	.2347181	55761	648			
19		.8322508	93845	2390	.5283119	130039	1460	.2291420	56409	632			
20		.8416353	91429	2416	.5153080	131499		.2235011	57041				
21		-0.8507782	-88990	+2439	+0.5021581	-132919	-1420	+0.2177970	-57656	-615			
22		.8596772	86528	2462	.4888662	134303	1384	.2120314	58255	599			
23		.8683300	84044	2484	.4754359	135650	1347	.2062059	58837	582			
24		.8767344	81536	2508	.4618709	136959	1309	.2003222	59403	566			
25		.8848880	79008	2528	.4481750	138231	1272	.1943819	59954	551			
26		-0.8927888	-76458	+2550	+0.4343519	-139465	-1234	+0.1883865	-60487	-533			
27		.9004346	73885	2573	.4204054	140663	1198	.1823378	61007	520			
28		.9078231	71293	2592	.4063391	141825	1162	.1762371	61509	502			
29		.9149524	68678	2615	.3921566	142946	1121	.1700862	61995	486			
30		.9218202	66042	2636	.3778620	144032	1086	.1638867	62467	472			
31		-0.9284244	-63386	+2656	+0.3634588	-145081	-1049	+0.1576400	-62920	-453			
Sept. 1		.9347630	60709	2677	.3489507	146089	1008	.1513480	63359	439			
2		.9408339	58011	2698	.3343418	147060	971	.1450121	63780	421			
3		.9466350	55291	2720	.3196358	147990	930	.1386341	64184	404			
4		.9521641	52553	2738	.3048368	148880	890	.1322157	64572	388			
5		-0.9574194	-49796	+2757	+0.2899488	-149731	-851	+0.1257585	-64942	-370			
6		.9623990	47018	2778	.2749757	150539	808	.1192643	65294	352			
7		.9671008	44220	2798	.2599218	151305	766	.1127349	65628	334			
8		.9715228	41404	2816	.2447913	152028	723	.1061721	65944	316			
9		.9756632	38569	2835	.2295885	152707	679	.0995777	66239	295			
10		-0.9795201	-35718	+2851	+0.2143178	-153338	-631	+0.0929538	-66515	-276			
11		.9830919	32850	2868	.1989840	153923	585	.0863023	66769	254			
12		.9863769	29969	2881	.1835917	154460	537	.0796254	67002	233			
13		.9893738	27077	2892	.1681457	154948	488	.0729252	67215	213			
14		.9920815	24175	2902	.1526509	155387	439	.0662037	67405	190			
15		-0.9944990	-21266	+2909	+0.1371122	-155778	-391	+0.0594632	-67573	-168			
16		.9966256	18351	2915	.1215344	156121	343	.0527059	67721	148			
17		.9984607	15433	2918	.1059223	156415	294	.0459338	67848	127			
18		1.0000040	12510	2923	.0902808	156665	250	.0391490	67953	105			
19		1.0012550	9587	2923	.0746143	156867	202	.0323537	68040	87			
20		-1.0022137	-6663	+2924	+0.0589276	-157026	-159	+0.0255497	-68107	-67			
21		1.0028800	3736	2927	.0432250	157138	112	.0187390	68155	48			
22		1.0032536	810	2926	.0275112	157208	70	.0119235	68183	28			
23		1.0033346	2118	2928	.0117904	157234	-26	.0051052	68194	-11			
24		1.0031228	5046	2928	-.0039330	157216	+18	-.0017142	68184	+10			
25		-1.0026182	-7973	+2927	-0.0196546	-157154	+62	-0.0085326	-68157	+27			
26		1.0018209	10901	2928	.0353700	157049	105	.0153483	68111	46			
27		1.0007308	13827	2926	.0510749	156900	149	.0221594	68046	65			
28		.9993481	16753	2926	.0667649	156707	193	.0289640	67963	83			
29		.9976728	19676	2923	.0824356	156471	236	.0357603	67861	102			
30		-0.9957052	-22599	+2923	-0.0980827	-156191	+280	-0.0425464	-67741	+120			
Oct. 1		-0.9934453	-2921	+2921	-0.1137018	-156191	+325	-0.0493205	-67741	+140			

SUN'S CO-ORDINATES, 1931.

Date.		MEAN EQUINOX OF 1950-0.								
		X			Y			Z		
Oct.	1	-0.9934453	+25520	+2921	-0.1137018	-155866	+325	-0.0493205	-67601	+140
	2	.9908933	28437	2917	.1292884	155496	370	.0560806	67442	159
	3	.9880496	31353	2916	.1448380	155081	415	.0628248	67263	179
	4	.9849143	34264	2911	.1603461	154622	459	.0695511	67066	197
	5	.9814879	37173	2909	.1758083	154116	506	.0762577	66848	218
	6	-0.9777706	+40075	+2902	-0.1912199	-153563	+553	-0.0829425	-66610	+238
	7	.9737631	42973	2898	.2065762	152963	600	.0896035	66350	260
	8	.9694658	45864	2891	.2218725	152314	649	.0962385	66070	280
	9	.9648794	48744	2880	.2371039	151615	699	.1028455	65768	302
	10	.9600050	51616	2872	.2522654	150867	748	.1094223	65445	323
	11	-0.9548434	+54475	+2859	-0.2673521	-150069	+798	-0.1159668	-65098	+347
	12	.9493959	57317	2842	.2823590	149223	846	.1224766	64729	369
	13	.9436642	60143	2826	.2972813	148327	896	.1289495	64340	389
	14	.9376499	62950	2807	.3121140	147383	944	.1353835	63930	410
	15	.9313549	65737	2787	.3268523	146392	991	.1417765	63498	432
	16	-0.9247812	+68501	+2764	-0.3414915	-145358	+1034	-0.1481263	-63048	+450
	17	.9179311	71243	2742	.3560273	144278	1080	.1544311	62578	470
	18	.9108068	73963	2720	.3704551	143156	1122	.1606889	62090	488
	19	.9034105	76660	2697	.3847707	141992	1164	.1668979	61584	506
	20	.8957445	79333	2673	.3989699	140786	1206	.1730563	61059	525
	21	-0.8878112	+81985	+2652	-0.4130485	-139541	+1245	-0.1791622	-60518	+541
	22	.8796127	84611	2626	.4270026	138254	1287	.1852140	59959	559
	23	.8711516	87214	2603	.4408280	136927	1327	.1912099	59383	576
	24	.8624302	89794	2580	.4545207	135560	1367	.1971482	58791	592
	25	.8534508	92348	2554	.4680767	134155	1405	.2030273	58180	611
	26	-0.8442160	+94879	+2531	-0.4814922	-132710	+1445	-0.2088453	-57555	+625
	27	.8347281	97382	2503	.4947632	131227	1483	.2146008	56912	643
	28	.8249899	99862	2480	.5078859	129704	1523	.2202920	56253	659
	29	.8150037	102317	2455	.5208563	128143	1561	.2259173	55577	676
	30	.8047720	104744	2427	.5336706	126544	1599	.2314750	54885	692
Nov.	31	-0.7942976	+107146	+2402	-0.5463250	-124905	+1639	-0.2369635	-54175	+710
	1	.7835830	109520	2374	.5588155	123227	1678	.2423810	53449	726
	2	.7726310	111867	2347	.5711382	121511	1716	.2477259	52707	742
	3	.7614443	114185	2318	.5832893	119755	1756	.2529966	51947	760
	4	.7500258	116474	2289	.5952648	117959	1796	.2581913	51168	779
	5	-0.7383784	+118732	+2258	-0.6070607	-116123	+1836	-0.2633081	-50372	+796
	6	.7265052	120956	2224	.6186730	114246	1877	.2683453	49559	813
	7	.7144096	123147	2191	.6300976	112330	1916	.2733012	48728	831
	8	.7020949	125300	2153	.6413306	110373	1957	.2781740	47879	849
	9	.6895649	127415	2115	.6523679	108378	1995	.2829619	47013	866
	10	-0.6768234	+129491	+2076	-0.6632057	-106346	+2032	-0.2876632	-46130	+883
	11	.6638743	131543	2032	.6738403	104277	2069	.2922762	45232	898
	12	.6507220	133513	1990	.6842680	102174	2103	.2967994	44318	914
	13	.6373707	135459	1946	.6944854	100037	2137	.3012312	43389	929
	14	.6238248	137361	1902	.7044891	97871	2166	.3055702	42447	942
	15	-0.6100887	+139219	+1858	-0.7142762	-95675	+2196	-0.3098148	-41494	+953
	16	.5961668	141814	1814	.7238437	93567	2227	.3139642	40666	966

SUN'S CO-ORDINATES, 1931.

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Date.	MEAN EQUINOX OF 1950-0.								
	X			Y			Z		
Nov. 16	-0.5961668	+141033	+1814	-0.7238437	-93448	+2227	-0.3139642	-40528	+966
17	.5820635	142802	1769	.7331885	91196	2252	.3180170	39548	980
18	.5677833	144528	1726	.7423081	88915	2281	.3219718	38559	989
19	.5533305	146210	1682	.7511996	86610	2305	.3258277	37559	1000
20	.5387095	147849	1639	.7598606	84279	2331	.3295836	36548	1011
21	-0.5239246	+149442	+1593	-0.7682885	-81923	+2356	-0.3332384	-35525	+1023
22	.5089804	150992	1550	.7764808	79542	2381	.3367909	34493	1032
23	.4938812	152497	1505	.7844350	77139	2403	.3402402	33452	1041
24	.4786315	153959	1462	.7921489	74712	2427	.3435854	32401	1051
25	.4632356	155377	1418	.7996201	72264	2448	.3468255	31339	1062
26	-0.4476979	+156750	+1373	-0.8068465	-69793	+2471	-0.3499594	-30269	+1070
27	.4320229	158079	1329	.8138258	67299	2494	.3529863	29189	1080
28	.4162150	159363	1284	.8205557	64785	2514	.3559052	28100	1089
29	.4002787	160604	1241	.8270342	62249	2536	.3587152	27002	1098
30	.3842183	161798	1194	.8332591	59690	2559	.3614154	25893	1109
Dec. 1	-0.3680385	+162946	+1148	-0.8392281	-57110	+2580	-0.3640047	-24775	+1118
2	.3517439	164049	1103	.8449391	54508	2602	.3664822	23648	1127
3	.3353390	165100	1051	.8503899	51885	2623	.3688470	22510	1138
4	.3188290	166104	1004	.8555784	49240	2645	.3710980	21364	1146
5	.3022186	167055	951	.8605024	46577	2663	.3732344	20207	1157
6	-0.2855131	+167955	+900	-0.8651601	-43893	+2684	-0.3752551	-19043	+1164
7	.2687176	168800	845	.8695494	41191	2702	.3771594	17871	1172
8	.2518376	169589	789	.8736685	38474	2717	.3789465	16690	1181
9	.2348787	170324	735	.8775159	35742	2732	.3806155	15503	1187
10	.2178463	171000	676	.8810901	32997	2745	.3821658	14311	1192
11	-0.2007463	+171620	+620	-0.8843898	-30240	+2757	-0.3835969	-13114	+1197
12	.1835843	172183	563	.8874138	27475	2765	.3849083	11913	1201
13	.1663660	172689	506	.8901613	24702	2773	.3860996	10710	1203
14	.1490971	173140	451	.8926315	21924	2778	.3871706	9503	1207
15	.1317831	173536	396	.8948239	19140	2784	.3881209	8295	1208
16	-0.1144295	+173876	+340	-0.8967379	-16352	+2788	-0.3889504	-7085	+1210
17	.0970419	174163	287	.8983731	13562	2790	.3896589	5875	1210
18	.0796256	174396	233	.8997293	10768	2794	.3902464	4663	1212
19	.0621860	174574	178	.9008061	7974	2794	.3907127	3452	1211
20	.0447286	174702	128	.9016035	5178	2796	.3910579	2239	1213
21	-0.0272584	+174775	+73	-0.9021213	-2383	+2795	-0.3912818	-1028	+1211
22	.0097809	174796	21	.9023596	412	2795	.3913846	183	1211
23	.0076987	174766	30	.9023184	3206	2794	.3913663	1393	1210
24	.0251753	174686	80	.9019978	5997	2791	.3912270	2602	1209
25	.0426439	174553	133	.9013981	8786	2789	.3909668	3811	1209
26	+0.0600992	+174371	+182	-0.9005195	-11574	+2788	-0.3905857	-5018	+1207
27	.0775363	174138	233	.8993621	14360	2786	.3900839	6226	1208
28	.0949501	173855	283	.8979261	17143	2783	.3894613	7431	1205
29	.1123356	173520	335	.8962118	19924	2781	.3887182	8636	1205
30	.1296876	173133	387	.8942194	22703	2779	.3878546	9841	1205
31	+0.1470009	+172692	+441	-0.8919491	-25477	+2774	-0.3868705	-11045	+1204
32	.1642701	172692	494	.8894014	25477	2771	.3857660	11045	1202

Date.	Horizontal Parallax	Aber- ration.	Mean Longi- tude.
Jan. 1	8.95	20.82	279.6887
11	8.95	20.82	289.5451
21	8.94	20.80	299.4016
31	8.93	20.78	309.2581
Feb. 10	8.92	20.74	319.1146
20	8.90	20.70	328.9710
Mar. 2	8.88	20.65	338.8275
12	8.86	20.60	348.6840
22	8.83	20.54	358.5404
Apr. 1	8.81	20.49	8.3969
11	8.78	20.43	18.2534
21	8.76	20.37	28.1099
May 1	8.73	20.32	37.9663
11	8.71	20.27	47.8228
21	8.69	20.22	57.6793
31	8.68	20.19	67.5358
June 10	8.67	20.16	77.3922
20	8.66	20.14	87.2487
30	8.66	20.13	97.1052
July 10	8.66	20.13	106.9617
20	8.66	20.14	116.8181
30	8.67	20.16	126.6746
Aug. 9	8.68	20.19	136.5311
19	8.70	20.23	146.3876
29	8.71	20.27	156.2440
Sept. 8	8.73	20.32	166.1005
18	8.76	20.37	175.9570
28	8.78	20.43	185.8134
Oct. 8	8.81	20.49	195.6699
18	8.83	20.55	205.5264
28	8.86	20.60	215.3829
Nov. 7	8.88	20.66	225.2393
17	8.90	20.71	235.0958
27	8.92	20.75	244.9523
Dec. 7	8.93	20.78	254.8088
17	8.94	20.80	264.6652
27	8.95	20.82	274.5217
37	8.95	20.82	284.3782

Mean Elements of Sun.

Epoch	..	1931 Jan. 1 ^d 0 ^h
Mean longitude	= L	279° 41' 19".2
Mean anomaly	= g	357 56 05.4
Mean longitude of perigee	= π	281 45 13.7
Log semi-major axis	= log a	0.0000001
Eccentricity	= e	0.0167381

PRECESSIONAL CONSTANTS.

Mean obliquity = ϵ $23^{\circ} 26' 53''.74$
= $23^{\circ} 44826$

	Natural No.	Logarithm
Sin ϵ ..	0.3979 2078	9.599 7966
Cos ϵ ..	0.9174 1978	9.962 5681
Tan ϵ ..	0.4337 3904	9.637 2285
Cot ϵ ..	2.3055 337	0.362 7715
Sec ϵ ..	1.0900 136	0.037 4319
Cosec ϵ ..	2.5130 630	0.400 2034

General precession = p $50''.2633$
= $0^{\circ} 0139620$

Precession in R.A. = m $3^s.07291$

Precession in Dec. = n $1^s.33628$

= $20''.0442$

log n^s 0.125898 log n" 1.301989

Ascending node of moving on

fixed ecliptic = Π .. $174^{\circ} 14'.03$

= $174^{\circ} 234$

Speed of rotation of ecliptic = π $0''.4709$

= $0^{\circ} 0001308$

log π'' 9.6729 log π° 6.1166

For reduction from

1931.0 to 1950.0 1950.0 to 1931.0

ζ_0 ..	..	7' 17".90	-7' 17".93
		= $0^m 29^s.193$	- $0^m 29^s.195$
Z ..	..	7' 17".93	-7' 17".90
		= $0^m 29^s.195$	- $0^m 29^s.193$
Sin θ ..	..	0.00184628	-0.00184628
Log sin θ ..	..	7.266298	7.266298n
Tan $\frac{1}{2}\theta$ ..	..	0.00092314	-0.00092314
Log tan $\frac{1}{2}\theta$ ..	..	6.965269	6.965269n
M ^s ..	..	58 ^s .389	-58 ^s .389
N ^s ..	..	25 ^s .388	-25 ^s .388
N" ..	..	380".82	-380".82
Log N ^s ..	..	1.40463	1.40463n
Log N" ..	..	2.58072	2.58072n

a .. $15' 55''.04$ - $15' 55''.04$
= $0^{\circ} 26529$ - $0^{\circ} 26529$

b .. $8''.95$ $8''.95$
= $0^{\circ} 00248$ $0^{\circ} 00248$

c .. $5^{\circ} 48'.7$ $5^{\circ} 32'.8$
= $5^{\circ} 812$ $5^{\circ} 547$

$$\begin{aligned}
 a &= a_0 + M + N \sin \bar{a} \tan \bar{\delta} \\
 \delta &= \delta_0 + N \cos \bar{a} \\
 \lambda &= \lambda_0 + a - b \cos(\lambda_0 + c) \tan \beta_0 \\
 \beta &= \beta_0 + b \sin(\lambda_0 + c) \\
 \Omega &= \Omega_0 + a - b \sin(\Omega_0 + c) \cot i_0 \\
 i &= i_0 + b \cos(\Omega_0 + c) \\
 \omega &= \omega_0 + b \sin(\Omega_0 + c) \operatorname{cosec} i_0
 \end{aligned}$$

MEAN EQUATOR, ORBIT, AND MEAN LONGITUDE.

Date.	Mean Equator.			Orbit.		Mean Longitude. (	Mean Solar Days.	Motion in Mean Longitude.
	i	Δ	Ω	Γ'	Ω			
Jan. I	22 00.6	200 52.8	-1 22.5	155 42.1	19 36.8	60 11.3	0.1	1 19.06
II	22 00.3	200 19.0	1 20.4	156 48.9	19 05.0	191 57.2	0.2	2 38.12
21	22 00.0	199 45.3	1 18.2	157 55.8	18 33.2	323 43.0	0.3	3 57.18
31	21 59.8	199 11.6	1 16.1	159 02.6	18 01.4	95 28.8	0.4	5 16.23
Feb. 10	21 59.5	198 37.8	1 13.9	160 09.4	17 29.7	227 14.7	0.5	6 35.29
20	21 59.2	198 04.1	-1 11.8	161 16.3	16 57.9	359 00.5	0.6	7 54.35
Mar. 2	21 58.9	197 30.3	1 09.6	162 23.1	16 26.1	130 46.4	0.7	9 13.41
12	21 58.7	196 56.5	1 07.4	163 30.0	15 54.4	262 32.2	0.8	10 32.47
22	21 58.5	196 22.7	1 05.3	164 36.9	15 22.6	34 18.0	0.9	11 51.53
Apr. I	21 58.2	195 48.9	1 03.1	165 43.7	14 50.8	166 03.9	1.0	13 10.58
II	21 58.0	195 15.1	-1 00.9	166 50.5	14 19.0	297 49.7	2.0	26 21.17
21	21 57.8	194 41.3	0 58.7	167 57.3	13 47.3	69 35.5	3.0	39 31.75
May I	21 57.6	194 07.5	0 56.5	169 04.2	13 15.5	201 21.4	4.0	52 42.33
11	21 57.4	193 33.7	0 54.3	170 11.0	12 43.7	333 07.2	5.0	65 52.92
21	21 57.2	192 59.9	0 52.1	171 17.9	12 11.9	104 53.1	6.0	79 03.50
31	21 57.0	192 26.1	-0 49.8	172 24.7	11 40.2	236 38.9	7.0	92 14.09
June 10	21 56.8	191 52.3	0 47.6	173 31.6	11 08.4	8 24.7	8.0	105 24.67
20	21 56.6	191 18.4	0 45.4	174 38.4	10 36.6	140 10.6	9.0	118 35.25
30	21 56.4	190 44.6	0 43.1	175 45.2	10 04.9	271 56.4	10.0	131 45.84
July 10	21 56.3	190 10.8	0 40.9	176 52.1	9 33.1	43 42.2	Hours.	
20	21 56.2	189 37.0	-0 38.7	177 58.9	9 01.3	175 28.1		0 32.94
30	21 56.0	189 03.1	0 36.4	179 05.8	8 29.5	307 13.9		1 05.88
Aug. 9	21 55.9	188 29.3	0 34.2	180 12.6	7 57.8	78 59.8		1 38.82
19	21 55.8	187 55.4	0 31.9	181 19.4	7 26.0	210 45.6	4	2 11.76
29	21 55.7	187 21.6	0 29.6	182 26.3	6 54.2	342 31.4	5	2 44.70
Sept. 8	21 55.6	186 47.7	-0 27.4	183 33.1	6 22.5	114 17.3	6	3 17.65
18	21 55.5	186 13.8	0 25.1	184 40.0	5 50.7	246 03.1	7	3 50.59
28	21 55.4	185 40.0	0 22.9	185 46.8	5 18.9	17 49.0	8	4 23.53
Oct. 8	21 55.3	185 06.1	0 20.6	186 53.7	4 47.1	149 34.8	9	4 56.47
18	21 55.2	184 32.2	0 18.3	188 00.5	4 15.4	281 20.6	10	5 29.41
28	21 55.2	183 58.3	-0 16.0	189 07.3	3 43.6	53 06.5	11	6 02.35
Nov. 7	21 55.1	183 24.5	0 13.8	190 14.2	3 11.8	184 52.3	12	6 35.29
17	21 55.1	182 50.6	0 11.5	191 21.0	2 40.0	316 38.1	13	7 08.23
27	21 55.0	182 16.7	0 09.2	192 27.9	2 08.3	88 24.0	14	7 41.17
Dec. 7	21 55.0	181 42.9	0 06.9	193 34.7	1 36.5	220 09.8	15	8 14.11
17	21 55.0	181 09.0	-0 04.7	194 41.6	1 04.7	351 55.7	16	8 47.06
27	21 54.9	180 35.1	0 02.4	195 48.4	0 33.0	123 41.5	17	9 20.00
37	21 54.9	180 01.3	-0 00.1	196 55.2	0 01.2	255 27.3	18	9 52.94
							19	10 25.88
							20	10 58.82
							21	11 31.76
							22	12 04.70
							23	12 37.64

Daily motion of $\Gamma' + 6'.68_4$ Daily motion of $\Omega - 3'.177$

Date.	Longitude.	Latitude.	Semi-diameter.	Horizontal Parallax.	Var. per Hour.	Age.	Transit, Meridian of Greenwich.	Var. per Hour
Jan.	° ' "	° ' "	' " "	' " "	" "	d	d h m	m
1.0	53 34 40.3	+2 45 58.0	15 35.46	57 13.26	+2.167	11.9	L 1 09 02.2	2.23
1.5	60 14 17.8	3 14 05.0	15 42.59	57 39.42	2.185		U 1 21 29.7	2.35
2.0	67 00 46.2	3 39 55.2	15 49.69	58 05.50	2.155	12.9	L 2 09 58.5	2.46
2.5	73 54 03.2	4 02 58.0	15 56.63	58 30.95	2.078		U 2 22 28.7	2.55
3.0	80 53 55.9	4 22 43.2	16 03.23	58 55.18	1.951	13.9	L 3 10 59.8	2.63
3.5	88 00 00.1	+4 38 41.9	16 09.33	59 17.60	+1.777		U 3 23 31.7	2.67
4.0	95 11 40.3	4 50 28.1	16 14.80	59 37.65	1.558	14.9	..	..
4.5	102 28 10.5	4 57 40.0	16 19.48	59 54.84	1.301		L 4 12 03.9	2.68
5.0	109 48 35.6	5 00 01.6	16 23.27	60 08.75	1.013	15.9	U 5 00 36.0	2.65
5.5	117 11 53.7	4 57 23.6	16 26.08	60 19.06	0.704		L 5 13 07.6	2.60
6.0	124 36 58.7	+4 49 44.3	16 27.86	60 25.60	+0.386	16.9	U 6 01 38.4	2.53
6.5	132 02 43.6	4 37 09.7	16 28.60	60 28.33	+0.069		L 6 14 08.2	2.43
7.0	139 28 03.0	4 19 53.8	16 28.33	60 27.32	-0.235	17.9	U 7 02 36.8	2.34
7.5	146 51 56.4	3 58 17.8	16 27.09	60 22.77	0.518		L 7 15 04.3	2.25
8.0	154 13 30.3	3 32 48.7	16 24.97	60 15.00	0.772	18.9	U 8 03 30.8	2.17
8.5	161 31 59.8	+3 03 58.0	16 22.08	60 04.38	-0.991		L 8 15 56.3	2.10
9.0	168 46 49.6	2 32 20.8	16 18.53	59 51.36	1.173	19.9	U 9 04 21.1	2.04
9.5	175 57 34.3	1 58 33.9	16 14.45	59 36.38	1.317		L 9 16 45.3	2.00
10.0	183 03 57.6	1 23 14.6	16 09.96	59 19.90	1.424	20.9	U 10 05 09.1	1.98
10.5	190 05 51.8	0 46 59.8	16 05.18	59 02.34	1.496		L 10 17 32.7	1.98
11.0	197 03 16.4	+0 10 25.0	16 00.21	58 44.11	-1.538	21.9	U 11 05 56.3	1.97
11.5	203 56 16.4	-0 25 56.2	15 55.15	58 25.54	1.554		L 11 18 20.0	1.99
12.0	210 45 01.4	1 01 32.3	15 50.07	58 06.91	1.548	22.9	U 12 06 44.0	2.02
12.5	217 29 43.7	1 35 54.5	15 45.05	57 48.45	1.525		L 12 19 08.4	2.06
13.0	224 10 37.0	2 08 36.7	15 40.11	57 30.35	1.490	23.9	U 13 07 33.4	2.10
13.5	230 47 55.4	-2 39 15.1	15 35.31	57 12.72	-1.447		L 13 19 58.9	2.15
14.0	237 21 52.7	3 07 29.1	15 30.66	56 55.65	1.397	24.9	U 14 08 25.0	2.20
14.5	243 52 41.4	3 33 00.4	15 26.18	56 39.19	1.345		L 14 20 51.7	2.24
15.0	250 20 32.2	3 55 33.4	15 21.87	56 23.37	1.292	25.9	U 15 09 18.8	2.27
15.5	256 45 33.8	4 14 55.4	15 17.73	56 08.19	1.238		L 15 21 46.2	2.29
16.0	263 07 53.3	-4 30 56.2	15 13.77	55 53.67	-1.184	26.9	U 16 10 13.8	2.30
16.5	269 27 35.6	4 43 28.3	15 09.99	55 39.79	1.129		L 16 22 41.3	2.28
17.0	275 44 44.6	4 52 27.1	15 06.39	55 26.57	1.074	27.9	U 17 11 08.5	2.25
17.5	281 59 22.3	4 57 50.4	15 02.97	55 14.03	1.016		L 17 23 35.2	2.20
18.0	288 11 30.7	4 59 38.7	14 59.75	55 02.19	0.956	28.9	..	..
18.5	294 21 11.9	-4 57 54.7	14 56.73	54 51.11	-0.891		U 18 12 01.3	2.14
19.0	300 28 28.4	4 52 43.9	14 53.93	54 40.85	0.818	0.2	L 19 00 26.5	2.07
19.5	306 33 24.1	4 44 13.3	14 51.39	54 31.51	0.737		U 19 12 50.9	2.00
20.0	312 36 04.5	4 32 32.3	14 49.12	54 23.20	0.647	1.2	L 20 01 14.4	1.93
20.5	318 36 37.7	4 17 51.3	14 47.17	54 16.02	0.546		U 20 13 37.1	1.86
21.0	324 35 14.1	-4 00 22.4	14 45.57	54 10.14	-0.433	2.2	L 21 01 59.0	1.80
21.5	330 32 07.3	3 40 18.8	14 44.35	54 05.67	0.308		U 21 14 20.2	1.74
22.0	336 27 34.3	3 17 54.5	14 43.57	54 02.79	0.170	3.2	L 22 02 40.7	1.69
22.5	342 21 55.2	2 53 23.8	14 43.25	54 01.64	-0.019		U 22 15 00.8	1.66
23.0	348 15 33.6	2 27 02.0	14 43.45	54 02.37	+0.143	4.2	L 23 03 20.5	1.63
23.5	354 08 56.3	-1 59 04.4	14 44.20	54 05.13	+0.318		U 23 15 40.0	1.62
24.0	0 02 33.4	-1 29 46.6	14 45.54	54 10.04	+0.503	5.2	L 24 03 59.4	1.60

Date.	Longitude.	Latitude.	Semi-diameter.	Horizontal Parallax.	Var. per Hour.	Age.	Transit, Meridian of Greenwich.	Var. per Hour
Jan. 24.0	0° 02' 33".4	-1° 29' 46".6	14' 45".54	54' 10".04	+0.503	d 5.2	L 24 03 59.4	1.60
24.5	5 56 58.1	0 59 24.8	14 47.50	54 17.23	0.696		U 24 16 18.9	1.63
25.0	11 52 45.9	-0 28 15.3	14 50.10	54 26.78	0.897	6.2	L 25 04 38.5	1.65
25.5	17 50 34.8	+0 03 24.8	14 53.37	54 38.76	1.101		U 25 16 58.5	1.69
26.0	23 51 04.5	0 35 18.0	14 57.30	54 53.21	1.306	7.2	L 26 05 19.1	1.74
26.5	29 54 56.1	+1 07 05.8	15 01.90	55 10.10	+1.509		U 26 17 40.3	1.80
27.0	36 02 51.1	1 38 28.8	15 07.16	55 29.40	1.705	8.2	L 27 06 02.3	1.88
27.5	42 15 30.6	2 09 06.0	15 13.04	55 50.99	1.890		U 27 18 25.4	1.97
28.0	48 33 34.1	2 38 35.3	15 19.50	56 14.69	2.057	9.2	L 28 06 49.6	2.07
28.5	54 57 38.8	3 06 33.1	15 26.47	56 40.27	2.202		U 28 19 15.1	2.18
29.0	61 28 17.4	+3 32 33.9	15 33.86	57 07.41	+2.316	10.2	L 29 07 41.9	2.29
29.5	68 05 57.6	3 56 11.2	15 41.57	57 35.71	2.394		U 29 20 10.1	2.40
30.0	74 50 59.3	4 16 57.4	15 49.47	58 04.69	2.429	11.2	L 30 08 39.6	2.50
30.5	81 43 33.5	4 34 24.5	15 57.40	58 33.80	2.414		U 30 21 10.2	2.59
31.0	88 43 40.5	4 48 05.0	16 05.20	59 02.41	2.344	12.2	L 31 09 41.7	2.64
Feb. 31.5	95 51 08.5	+4 57 33.1	16 12.67	59 29.83	+2.216		U 31 22 13.6	2.67
1.0	103 05 32.3	5 02 26.0	16 19.62	59 55.35	2.028	13.2	L 1 10 45.7	2.66
1.5	110 26 13.7	5 02 25.6	16 25.86	60 18.27	1.781		U 1 23 17.5	2.63
2.0	117 52 21.0	4 57 19.9	16 31.21	60 37.89	1.480	14.2	L 2 11 48.7	2.57
2.5	125 22 51.5	4 47 04.5	16 35.50	60 53.62	1.134		..	..
3.0	132 56 32.8	+4 31 43.4	16 38.59	61 04.98	+0.754	15.2	U 3 00 19.1	2.49
3.5	140 32 06.5	4 11 29.7	16 40.41	61 11.65	+0.353		L 3 12 48.4	2.40
4.0	148 08 11.5	3 46 45.6	16 40.89	61 13.44	-0.053	16.2	U 4 01 16.7	2.32
4.5	155 43 28.1	3 18 01.1	16 40.07	61 10.40	0.450		L 4 13 44.1	2.24
5.0	163 16 41.2	2 45 52.8	16 37.98	61 02.72	0.823	17.2	U 5 02 10.5	2.17
5.5	170 46 43.6	+2 11 02.2	16 34.72	60 50.78	-1.160		L 5 14 36.2	2.12
6.0	178 12 38.1	1 34 13.5	16 30.44	60 35.06	1.451	18.2	U 6 03 01.3	2.08
6.5	185 33 38.9	0 56 11.4	16 25.29	60 16.15	1.691		L 6 15 26.1	2.05
7.0	192 49 12.2	+0 17 39.9	16 19.44	59 54.69	1.877	19.2	U 7 03 50.6	2.04
7.5	199 58 56.0	-0 20 39.9	16 13.08	59 31.33	2.008		L 7 16 15.1	2.05
8.0	207 02 38.8	-0 58 10.1	16 06.37	59 06.70	-2.088	20.2	U 8 04 39.7	2.06
8.5	214 00 18.8	1 34 16.9	15 59.47	58 41.40	2.121		L 8 17 04.5	2.08
9.0	220 52 01.9	2 08 31.2	15 52.54	58 15.96	2.113	21.2	U 9 05 29.7	2.12
9.5	227 38 00.6	2 40 28.1	15 45.69	57 50.83	2.070		L 9 17 55.3	2.15
10.0	234 18 31.3	3 09 46.6	15 39.03	57 26.38	2.000	22.2	U 10 06 21.4	2.19
10.5	240 53 54.4	-3 36 09.9	15 32.64	57 02.91	-1.908		L 10 18 47.9	2.23
11.0	247 24 31.9	3 59 24.4	15 26.57	56 40.65	1.800	23.2	U 11 07 14.9	2.26
11.5	253 50 46.6	4 19 19.7	15 20.88	56 19.76	1.681		L 11 19 42.1	2.28
12.0	260 13 01.0	4 35 48.0	15 15.59	56 00.33	1.556	24.2	U 12 08 09.5	2.28
12.5	266 31 37.0	4 48 44.2	15 10.71	55 42.43	1.428		L 12 20 36.9	2.28
13.0	272 46 55.3	-4 58 05.2	15 06.25	55 26.05	-1.300	25.2	U 13 09 04.1	2.25
13.5	278 59 15.1	5 03 50.1	15 02.21	55 11.21	1.175		L 13 21 30.9	2.21
14.0	285 08 53.6	5 05 59.9	14 58.57	54 57.85	1.053	26.2	U 14 09 57.1	2.15
14.5	291 16 06.5	5 04 37.4	14 55.32	54 45.92	0.935		L 14 22 22.6	2.09
15.0	297 21 07.6	4 59 47.3	14 52.45	54 35.39	0.822	27.2	U 15 10 47.3	2.03
15.5	303 24 09.5	-4 51 35.7	14 49.94	54 26.18	-0.714		L 15 23 11.2	1.96
16.0	309 25 23.7	-4 40 10.8	14 47.78	54 18.25	-0.608	28.2	U 16 11 34.3	1.89

Date.	Longitude.	Latitude.	Semi-diameter.	Horizontal Parallax.	Var. per Hour.	Age.	Transit, Meridian of Greenwich.	Var. per Hour
Feb. 16.0	309 25 23.7	-4 40 10.8	14 47.78	54 18.25	-0.608	28.2	U 16 11 34.3	1.89
16.5	315 25 00.9	4 25 42.1	14 45.96	54 11.57	0.505		L 16 23 56.5	1.83
17.0	321 23 11.6	4 08 20.3	14 44.47	54 06.11	0.404	29.2	..	..
17.5	327 20 06.4	3 48 18.1	14 43.32	54 01.87	0.302		U 17 12 18.1	1.77
18.0	333 15 56.2	3 25 49.0	14 42.50	53 58.87	0.198	0.5	L 18 00 39.0	1.72
18.5	339 10 53.3	-3 01 07.5	14 42.02	53 57.13	-0.091		U 18 12 59.4	1.68
19.0	345 05 11.0	2 34 29.3	14 41.91	53 56.70	+0.021	1.5	L 19 01 19.3	1.65
19.5	350 59 04.5	2 06 10.8	14 42.17	53 57.66	0.140		U 19 13 38.9	1.63
20.0	356 52 50.9	1 36 28.8	14 42.83	54 00.08	0.265	2.5	L 20 01 58.4	1.62
20.5	2 46 49.8	1 05 41.0	14 43.91	54 04.05	0.398		U 20 14 17.7	1.62
21.0	8 41 22.7	-0 34 05.1	14 45.44	54 09.67	+0.540	3.5	L 21 02 37.2	1.63
21.5	14 36 54.0	-0 01 59.6	14 47.45	54 17.05	0.691		U 21 14 56.8	1.65
22.0	20 33 50.3	+0 30 17.0	14 49.97	54 26.29	0.849	4.5	L 22 03 16.8	1.69
22.5	26 32 40.8	1 02 25.8	14 53.01	54 37.46	1.015		U 22 15 37.3	1.73
23.0	32 33 56.5	1 34 07.5	14 56.61	54 50.67	1.186	5.5	L 23 03 58.4	1.80
23.5	38 38 10.6	+2 05 02.3	15 00.77	55 05.95	+1.361		U 23 16 20.4	1.87
24.0	44 45 57.5	2 34 49.7	15 05.51	55 23.33	1.536	6.5	L 24 04 43.2	1.95
24.5	50 57 52.6	3 03 08.9	15 10.81	55 42.80	1.709		U 24 17 07.1	2.04
25.0	57 14 31.3	3 29 38.2	15 16.68	56 04.32	1.876	7.5	L 25 05 32.1	2.13
25.5	63 36 28.1	3 53 55.1	15 23.06	56 27.77	2.030		U 25 17 58.3	2.24
26.0	70 04 16.0	+4 15 36.6	15 29.93	56 52.98	+2.167	8.5	L 26 06 25.8	2.34
26.5	76 38 24.5	4 34 19.1	15 37.21	57 19.68	2.280		U 26 18 54.4	2.43
27.0	83 19 18.7	4 49 38.6	15 44.81	57 47.57	2.362	9.5	L 27 07 24.0	2.50
27.5	90 07 17.6	5 01 11.9	15 52.62	58 16.23	2.407		U 27 19 54.4	2.56
28.0	97 02 32.1	5 08 36.5	16 00.50	58 45.16	2.406	10.5	L 28 08 25.4	2.59
28.5	104 05 04.2	+5 11 32.1	16 08.29	59 13.77	+2.353		U 28 20 56.5	2.59
Mar. 1.0	111 14 44.3	5 09 41.5	16 15.82	59 41.40	2.242	11.5	L 1 09 27.5	2.57
1.5	118 31 11.4	5 02 52.3	16 22.89	60 07.34	2.071		U 1 21 58.1	2.52
2.0	125 53 51.5	4 50 57.9	16 29.29	60 30.86	1.838	12.5	L 2 10 28.0	2.46
2.5	133 21 58.1	4 33 59.2	16 34.84	60 51.22	1.545		U 2 22 57.2	2.40
3.0	140 54 33.2	+4 12 05.4	16 39.34	61 07.73	+1.199	13.5	L 3 11 25.6	2.33
3.5	148 30 28.6	3 45 34.5	16 42.63	61 19.82	0.809		U 3 23 53.1	2.27
4.0	156 08 29.1	3 14 53.5	16 44.60	61 27.03	+0.389	14.5	..	..
4.5	163 47 14.6	2 40 38.0	16 45.16	61 29.09	-0.047		L 4 12 20.0	2.21
5.0	171 25 24.6	2 03 30.1	16 44.29	61 25.92	0.480	15.5	U 5 00 46.2	2.17
5.5	179 01 40.7	+1 24 16.8	16 42.04	61 17.64	-0.895		L 5 13 12.1	2.14
6.0	186 34 50.9	0 43 48.0	16 38.48	61 04.57	1.277	16.5	U 6 01 37.6	2.12
6.5	194 03 51.1	+0 02 53.7	16 33.74	60 47.18	1.613		L 6 14 03.0	2.12
7.0	201 27 47.4	-0 37 37.8	16 27.99	60 26.08	1.894	17.5	U 7 02 28.5	2.13
7.5	208 45 57.6	1 17 02.1	16 21.42	60 01.96	2.115		L 7 14 54.1	2.15
8.0	215 57 50.7	-1 54 39.7	16 14.23	59 35.57	-2.273	18.5	U 8 03 20.0	2.18
8.5	223 03 07.5	2 29 56.8	16 06.62	59 07.64	2.372		L 8 15 46.3	2.21
9.0	230 01 39.1	3 02 25.7	15 58.78	58 38.87	2.414	19.5	U 9 04 13.1	2.25
9.5	236 53 26.0	3 31 44.7	15 50.89	58 09.91	2.405		L 9 16 40.2	2.28
10.0	243 38 36.7	3 57 37.4	15 43.10	57 41.32	2.352	20.5	U 10 05 07.8	2.31
10.5	250 17 26.3	-4 19 52.4	15 35.55	57 13.59	-2.264		L 10 17 35.6	2.33
11.0	256 50 14.9	-4 38 22.3	15 28.34	56 47.11	-2.145	21.5	U 11 06 03.6	2.33

Date.	Longitude.	Latitude.	Semi-diameter.	Horizontal Parallax.	Var. per Hour.	Age.	Transit, Meridian of Greenwich.	Var. per Hour
Mar. 10.0	243 38 36.7	-3 57 37.4	15 43.10	57 41.32	-2.352	20.5	U 10 05 07.8	2.31
10.5	250 17 26.3	4 19 52.4	15 35.55	57 13.59	2.264		L 10 17 35.6	2.33
11.0	256 50 14.9	4 38 22.3	15 28.34	56 47.11	2.145	21.5	U 11 06 03.6	2.33
11.5	263 17 26.5	4 53 03.5	15 21.55	56 22.21	2.003		L 11 18 31.5	2.32
12.0	269 39 27.6	5 03 55.0	15 15.26	55 59.11	1.845	22.5	U 12 06 59.2	2.29
12.5	275 56 46.4	-5 10 58.3	15 09.50	55 37.97	-1.677		L 12 19 26.5	2.25
13.0	282 09 51.5	5 14 16.9	15 04.30	55 18.89	1.503	23.5	U 13 07 53.3	2.20
13.5	288 19 11.8	5 13 55.4	14 59.67	55 01.91	1.326		L 13 20 19.3	2.13
14.0	294 25 15.5	5 10 00.4	14 55.63	54 47.06	1.151	24.5	U 14 08 44.4	2.06
14.5	300 28 29.6	5 02 39.0	14 52.15	54 34.28	0.980		L 14 21 08.8	2.00
15.0	306 29 20.2	-4 51 59.9	14 49.22	54 23.52	-0.814	25.5	U 15 09 32.3	1.92
15.5	312 28 11.5	4 38 12.4	14 46.81	54 14.71	0.656		L 15 21 54.9	1.85
16.0	318 25 26.4	4 21 27.0	14 44.92	54 07.74	0.506	26.5	U 16 10 16.8	1.80
16.5	324 21 25.9	4 01 55.4	14 43.49	54 02.53	0.365		L 16 22 38.0	1.75
17.0	330 16 30.1	3 39 50.2	14 42.52	53 58.96	0.232	27.5	U 17 10 58.7	1.70
17.5	336 10 57.0	-3 15 24.9	14 41.97	53 56.94	-0.106		L 17 23 18.8	1.66
18.0	342 05 04.2	2 48 54.4	14 41.82	53 56.38	+0.012	28.5	U 18 11 38.6	1.64
18.5	347 59 07.8	2 20 34.3	14 42.05	53 57.21	0.125		L 18 23 58.1	1.63
19.0	353 53 23.4	1 50 41.5	14 42.63	53 59.36	0.233	29.5	..	..
19.5	359 48 06.5	1 19 33.5	14 43.56	54 02.79	0.338		U 19 12 17.6	1.62
20.0	5 43 32.3	-0 47 28.9	14 44.84	54 07.46	+0.441	0.7	L 20 00 37.0	1.63
20.5	11 39 56.2	-0 14 46.8	14 46.45	54 13.37	0.544		U 20 12 56.6	1.64
21.0	17 37 34.3	+0 18 13.0	14 48.40	54 20.52	0.648	1.7	L 21 01 16.4	1.67
21.5	23 36 43.4	0 51 10.1	14 50.69	54 28.93	0.755		U 21 13 36.6	1.71
22.0	29 37 41.2	1 23 43.8	14 53.33	54 38.64	0.864	2.7	L 22 01 57.4	1.76
22.5	35 40 46.5	+1 55 33.2	14 56.34	54 49.69	+0.978		U 22 14 18.8	1.82
23.0	41 46 19.6	2 26 17.1	14 59.73	55 02.13	1.096	3.7	L 23 02 41.0	1.89
23.5	47 54 41.4	2 55 34.4	15 03.51	55 16.01	1.218		U 23 15 04.1	1.96
24.0	54 06 14.7	3 23 03.9	15 07.70	55 31.37	1.342	4.7	L 24 03 28.1	2.05
24.5	60 21 22.3	3 48 24.5	15 12.29	55 48.23	1.468		U 24 15 53.2	2.14
25.0	66 40 28.2	+4 11 15.0	15 17.29	56 06.59	+1.593	5.7	L 25 04 19.4	2.23
25.5	73 03 56.1	4 31 14.7	15 22.70	56 26.44	1.714		U 25 16 46.6	2.31
26.0	79 32 09.4	4 48 03.4	15 28.49	56 47.69	1.827	6.7	L 26 05 14.8	2.38
26.5	86 05 30.1	5 01 21.4	15 34.63	57 10.23	1.928		U 26 17 43.8	2.44
27.0	92 44 18.0	5 10 49.9	15 41.08	57 33.88	2.011	7.7	L 27 06 13.4	2.48
27.5	99 28 49.8	+5 16 11.6	15 47.76	57 58.39	+2.071		U 27 18 43.2	2.49
28.0	106 19 17.6	5 17 11.3	15 54.59	58 23.47	2.103	8.7	L 28 07 13.2	2.49
28.5	113 15 48.3	5 13 36.3	16 01.46	58 48.71	2.097		U 28 19 43.0	2.46
29.0	120 18 21.9	5 05 17.7	16 08.25	59 13.63	2.049	9.7	L 29 08 12.3	2.42
29.5	127 26 50.4	4 52 10.7	16 14.81	59 37.70	1.954		U 29 20 41.1	2.37
30.0	134 40 57.2	+4 34 16.5	16 20.97	60 00.32	+1.807	10.7	L 30 09 00.2	2.32
30.5	142 00 16.1	4 11 42.4	16 26.57	60 20.86	1.607		U 30 21 36.7	2.26
31.0	149 24 11.3	3 44 43.0	16 31.42	60 38.68	1.354	11.7	L 31 10 03.5	2.22
31.5	156 51 57.7	3 13 40.6	16 35.37	60 53.17	1.052		U 31 22 29.0	2.18
Apr. 1.0	164 22 41.7	2 39 05.3	16 38.26	61 03.77	0.708	12.7	L 1 10 55.8	2.15
1.5	171 55 22.8	+2 01 33.9	16 39.97	61 10.04	+0.332		U 1 23 21.4	2.13
2.0	179 28 55.0	+1 21 49.7	16 40.41	61 11.67	-0.064	13.7	L 2 11 47.0	2.13

Date.	Longitude.	Latitude.	Semi-diameter.	Horizontal Parallax.	Var. per Hour.	Age.	Transit, Meridian of Greenwich.	Var. per Hour
Apr. 1-0	164 22 41.7	+2 39 05.3	16 38.26	61 03.77	+0.708	12.7	L 1 10 55.8	2.15
1-5	171 55 22.8	2 01 33.9	16 39.97	61 10.04	+0.332		U 1 23 21.4	2.13
2-0	179 28 55.0	1 21 49.7	16 40.41	61 11.67	-0.064	13.7	L 2 11 47.0	2.13
2-5	187 02 09.6	+0 40 40.2	16 39.55	61 08.49	0.465		..	..
3-0	194 33 58.0	-0 01 04.5	16 37.39	61 00.56	0.856	14.7	U 3 00 12.6	2.14
3-5	202 03 13.5	-0 42 34.1	16 33.98	60 48.06	-1.222		L 3 12 38.4	2.16
4-0	209 28 54.2	1 23 00.4	16 29.43	60 31.37	1.552	15.7	U 4 01 04.5	2.20
4-5	216 50 05.3	2 01 38.9	16 23.88	60 11.00	1.835		L 4 13 31.1	2.24
5-0	224 06 00.2	2 37 50.4	16 17.50	59 47.56	2.063	16.7	U 5 01 58.2	2.28
5-5	231 16 02.0	3 11 02.0	16 10.46	59 21.72	2.233		L 5 14 25.9	2.33
6-0	238 19 43.3	-3 40 47.6	16 02.96	58 54.19	-2.345	17.7	U 6 02 54.1	2.37
6-5	245 16 47.5	4 06 47.9	15 55.19	58 25.67	2.400		L 6 15 22.7	2.40
7-0	252 07 07.1	4 28 50.0	15 47.32	57 56.80	2.403	18.7	U 7 03 51.6	2.41
7-5	258 50 43.5	4 46 46.3	15 39.53	57 28.19	2.358		L 7 16 20.6	2.41
8-0	265 27 46.2	5 00 34.3	15 31.95	57 00.38	2.272	19.7	U 8 04 49.4	2.39
8-5	271 58 31.1	-5 10 15.2	15 24.71	56 33.81	-2.152		L 8 17 17.9	2.35
9-0	278 23 19.9	5 15 53.6	15 17.91	56 08.84	2.004	20.7	U 9 05 45.7	2.29
9-5	284 42 38.5	5 17 36.2	15 11.63	55 45.79	1.835		L 9 18 12.9	2.23
10-0	290 56 56.4	5 15 31.5	15 05.93	55 24.86	1.651	21.7	U 10 06 39.1	2.15
10-5	297 06 45.1	5 09 49.2	15 00.84	55 06.21	1.456		L 10 19 04.4	2.07
11-0	303 12 37.8	-5 00 40.1	14 56.41	54 49.94	-1.255	22.7	U 11 07 28.7	1.98
11-5	309 15 08.4	4 48 15.5	14 52.64	54 36.09	1.053		L 11 19 52.0	1.91
12-0	315 14 50.8	4 32 47.1	14 49.53	54 24.67	0.852	23.7	U 12 08 14.5	1.84
12-5	321 12 18.4	4 14 27.3	14 47.07	54 15.63	0.656		L 12 20 36.2	1.78
13-0	327 08 03.9	3 53 28.9	14 45.23	54 08.90	0.466	24.7	U 13 08 57.2	1.73
13-5	333 02 38.5	-3 30 05.0	14 44.01	54 04.41	-0.285		L 13 21 17.7	1.68
14-0	338 56 31.9	3 04 29.7	14 43.36	54 02.02	-0.114	25.7	U 14 09 37.6	1.65
14-5	344 50 12.3	2 36 57.6	14 43.25	54 01.62	+0.046		L 14 21 57.3	1.63
15-0	350 44 06.0	2 07 44.2	14 43.64	54 03.07	0.193	26.7	U 15 10 16.8	1.63
15-5	356 38 36.9	1 37 05.9	14 44.50	54 06.21	0.329		L 15 22 36.3	1.63
16-0	2 34 07.5	-1 05 20.0	14 45.78	54 10.91	+0.453	27.7	U 16 10 55.8	1.63
16-5	8 30 57.8	-0 32 44.9	14 47.45	54 17.04	0.566		L 16 23 15.5	1.66
17-0	14 29 26.3	+0 00 20.0	14 49.47	54 24.46	0.668	28.7	U 17 11 35.6	1.69
17-5	20 29 49.4	0 33 34.3	14 51.80	54 33.03	0.759		L 17 23 56.1	1.74
18-0	26 32 21.9	1 06 37.0	14 54.42	54 42.64	0.842	0-0	..	..
18-5	32 37 17.0	+1 39 06.1	14 57.30	54 53.20	+0.917		U 18 12 17.3	1.80
19-0	38 44 46.8	2 10 39.5	15 00.42	55 04.64	0.987	1-0	L 19 00 39.2	1.86
19-5	44 55 02.1	2 40 54.3	15 03.75	55 16.88	1.052		U 19 13 01.9	1.93
20-0	51 08 12.5	3 09 28.0	15 07.29	55 29.88	1.114	2-0	L 20 01 25.6	2.01
20-5	57 24 27.4	3 35 58.0	15 11.03	55 43.61	1.174		U 20 13 50.2	2.10
21-0	63 43 55.6	+4 00 02.7	15 14.97	55 58.04	+1.232	3-0	L 21 02 15.9	2.18
21-5	70 06 45.3	4 21 20.8	15 19.09	56 13.17	1.289		U 21 14 42.6	2.26
22-0	76 33 04.7	4 39 32.4	15 23.40	56 28.98	1.346	4-0	L 22 03 10.2	2.33
22-5	83 03 01.7	4 54 18.9	15 27.89	56 45.47	1.400		U 22 15 38.6	2.39
23-0	89 36 44.0	5 05 23.7	15 32.55	57 02.58	1.452	5-0	L 23 04 07.6	2.43
23-5	96 14 18.7	+5 12 31.6	15 37.37	57 20.29	+1.498		U 23 16 36.9	2.45
24-0	102 55 52.6	+5 15 30.2	15 42.33	57 38.50	+1.536	6-0	L 24 05 06.3	2.44

Date.	Longitude.	Latitude.	Semi-diameter.	Horizontal Parallax.	Var. per Hour.	Age.	Transit, Meridian of Greenwich.	Var. per Hour
Apr. 24.0	102 55 52.6	+5 15 30.2	15 42.33	57 38.50	+1.536	d	L 24 05 06.3	2.44
24.5	109 41 31.2	5 14 09.7	15 47.41	57 57.12	1.564		U 24 17 35.5	2.42
25.0	116 31 18.7	5 08 23.3	15 52.54	58 15.97	1.576	7.0	L 25 06 04.3	2.38
25.5	123 25 17.3	4 58 07.8	15 57.69	58 34.85	1.568		U 25 18 32.6	2.33
26.0	130 23 26.4	4 43 24.0	16 02.77	58 53.51	1.537	8.0	L 26 07 00.2	2.28
26.5	137 25 42.3	+4 24 16.9	16 07.71	59 11.62	+1.477		U 26 19 27.2	2.22
27.0	144 31 56.8	4 00 56.8	16 12.39	59 28.83	1.385	9.0	L 27 07 53.5	2.17
27.5	151 41 57.2	3 33 39.2	16 16.72	59 44.71	1.257		U 27 20 19.2	2.13
28.0	158 55 25.0	3 02 45.2	16 20.57	59 58.84	1.092	10.0	L 28 08 44.5	2.10
28.5	166 11 56.4	2 28 41.4	16 23.82	60 10.77	0.890		U 28 21 09.5	2.08
29.0	173 31 01.2	+1 52 00.0	16 26.35	60 20.06	+0.653	11.0	L 29 09 34.4	2.07
29.5	180 52 03.1	1 13 18.4	16 28.05	60 26.31	0.384		U 29 21 59.2	2.08
30.0	188 14 20.6	+0 33 17.8	16 28.84	60 29.18	+0.091	12.0	L 30 10 24.2	2.10
30.5	195 37 07.2	-0 07 17.6	16 28.63	60 28.42	-0.219		U 30 22 49.6	2.14
May 1.0	202 59 32.8	0 47 42.1	16 27.40	60 23.91	0.535	13.0	L 1 11 15.5	2.18
1.5	210 20 45.4	-1 27 10.5	16 25.14	60 15.61	-0.846		U 1 23 42.0	2.23
2.0	217 39 52.2	2 04 59.2	16 21.88	60 03.66	1.142	14.0	.. ..	..
2.5	224 56 02.2	2 40 28.4	16 17.70	59 48.29	1.413		L 2 12 09.1	2.29
3.0	232 08 27.5	3 13 03.2	16 12.68	59 29.87	1.651	15.0	U 3 00 37.0	2.35
3.5	239 16 24.9	3 42 14.3	16 06.95	59 08.84	1.847		L 3 13 05.6	2.40
4.0	246 19 17.8	-4 07 39.3	16 00.65	58 45.73	-1.997	16.0	U 4 01 34.7	2.45
4.5	253 16 37.0	4 29 01.8	15 53.94	58 21.10	2.100		L 4 14 04.3	2.47
5.0	260 08 01.5	4 46 11.9	15 46.97	57 55.51	2.155	17.0	U 5 02 34.0	2.47
5.5	266 53 18.9	4 59 05.4	15 39.90	57 29.56	2.163		L 5 15 03.5	2.45
6.0	273 32 24.7	5 07 43.0	15 32.87	57 03.77	2.128	18.0	U 6 03 32.7	2.41
6.5	280 05 22.6	-5 12 09.7	15 26.03	56 38.64	-2.054		L 6 16 01.3	2.35
7.0	286 32 23.9	5 12 33.5	15 19.48	56 14.61	1.946	19.0	U 7 04 29.0	2.27
7.5	292 53 46.0	5 09 04.9	15 13.34	55 52.06	1.808		L 7 16 55.7	2.18
8.0	299 09 52.0	5 01 56.2	15 07.68	55 31.31	1.646	20.0	U 8 05 21.3	2.09
8.5	305 21 09.5	4 51 20.6	15 02.59	55 12.62	1.465		L 8 17 45.9	2.00
9.0	311 28 09.9	-4 37 32.3	14 58.12	54 56.20	-1.270	21.0	U 9 06 09.4	1.92
9.5	317 31 27.6	4 20 45.5	14 54.30	54 42.18	1.065		L 9 18 32.0	1.85
10.0	323 31 38.6	4 01 14.7	14 51.16	54 30.66	0.854	22.0	U 10 06 53.7	1.78
10.5	329 29 20.3	3 39 14.5	14 48.72	54 21.69	0.641		L 10 19 14.6	1.72
11.0	335 25 10.7	3 14 59.6	14 46.97	54 15.27	0.429	23.0	U 11 07 35.0	1.68
11.5	341 19 47.7	-2 48 44.7	14 45.91	54 11.38	-0.221		L 11 19 55.0	1.65
12.0	347 13 48.5	2 20 44.9	14 45.52	54 09.95	-0.020	24.0	U 12 08 14.6	1.63
12.5	353 07 49.5	1 51 15.6	14 45.77	54 10.88	+0.172		L 12 20 34.1	1.62
13.0	359 02 25.2	1 20 32.9	14 46.63	54 14.04	0.353	25.0	U 13 08 53.5	1.63
13.5	4 58 08.6	0 48 53.4	14 48.06	54 19.29	0.520		L 13 21 13.1	1.64
14.0	10 55 30.2	-0 16 34.8	14 50.02	54 26.47	+0.673	26.0	U 14 09 32.9	1.67
14.5	16 54 58.0	+0 16 04.3	14 52.45	54 35.38	0.809		L 14 21 53.1	1.71
15.0	22 56 56.9	0 48 44.2	14 55.29	54 45.83	0.929	27.0	U 15 10 13.9	1.76
15.5	29 01 48.8	1 21 04.2	14 58.50	54 57.61	1.031		L 15 22 35.4	1.83
16.0	35 09 51.7	1 52 42.4	15 02.01	55 10.50	1.115	28.0	U 16 10 57.7	1.90
16.5	41 21 20.7	+2 23 16.0	15 05.77	55 24.29	+1.181		L 16 23 21.0	1.98
17.0	47 36 26.3	+2 52 22.1	15 09.72	55 38.77	+1.230	29.0	U 17 11 45.2	2.07

Date.	Longitude.	Latitude.	Semi-diameter.	Horizontal Parallax.	Var. per Hour.	Age.	Transit, Meridian of Greenwich.	Var. per Hour
May	17.0	0 47 36 26.3	+2 52 22.1	15 09.72	55 38.77	+1.230	d 29.0 U 17 11 45.2	m 2.07
	17.5	53 55 16.0	3 19 36.9	15 13.79	55 53.74	1.262	..	..
	18.0	60 17 53.3	3 44 36.7	15 17.95	56 09.00	1.280	0.4 L 18 00 10.6	2.16
	18.5	66 44 18.4	4 06 58.6	15 22.15	56 24.41	1.285	U 18 12 37.0	2.24
	19.0	73 14 28.0	4 26 20.6	15 26.34	56 39.78	1.277	1.4 L 19 01 04.4	2.33
	19.5	79 48 16.5	+4 42 22.3	15 30.49	56 55.02	+1.260	U 19 13 32.8	2.39
	20.0	86 25 35.7	4 54 45.2	15 34.57	57 10.01	1.236	2.4 L 20 02 01.8	2.44
	20.5	93 06 16.1	5 03 13.8	15 38.57	57 24.67	1.206	U 20 14 31.3	2.47
	21.0	99 50 06.5	5 07 35.4	15 42.45	57 38.93	1.171	3.4 L 21 03 01.0	2.47
	21.5	106 36 55.5	5 07 41.0	15 46.22	57 52.76	1.133	U 21 15 30.5	2.45
	22.0	113 26 31.6	+5 03 25.2	15 49.86	58 06.12	+1.092	4.4 L 22 03 59.7	2.40
	22.5	120 18 43.8	4 54 46.7	15 53.36	58 18.96	1.047	U 22 16 28.2	2.35
	23.0	127 13 21.5	4 41 48.4	15 56.70	58 31.23	0.998	5.4 L 23 04 56.0	2.29
	23.5	134 10 15.3	4 24 37.4	15 59.88	58 42.89	0.943	U 23 17 23.1	2.22
	24.0	141 09 16.3	4 03 25.2	16 02.86	58 53.85	0.881	6.4 L 24 05 49.3	2.16
	24.5	148 10 16.2	+3 38 27.7	16 05.63	59 04.01	+0.810	U 24 18 14.9	2.10
	25.0	155 13 06.5	3 10 04.9	16 08.15	59 13.24	0.727	7.4 L 25 06 39.8	2.06
	25.5	162 17 39.0	2 38 40.6	16 10.37	59 21.39	0.629	U 25 19 04.3	2.03
	26.0	169 23 43.8	2 04 42.6	16 12.24	59 28.26	0.515	8.4 L 26 07 28.4	2.01
	26.5	176 31 09.4	1 28 42.3	16 13.71	59 33.67	0.383	U 26 19 52.5	2.00
	27.0	183 39 42.2	+0 51 13.9	16 14.72	59 37.38	+0.233	9.4 L 27 08 16.5	2.01
	27.5	190 49 05.0	+0 12 54.0	16 15.22	59 39.19	+0.066	U 27 20 40.8	2.04
	28.0	197 58 57.4	-0 25 38.9	16 15.14	59 38.89	-0.117	10.4 L 28 09 05.5	2.08
	28.5	205 08 55.3	1 03 45.8	16 14.44	59 36.32	0.313	U 28 21 30.7	2.13
	29.0	212 18 31.0	1 40 47.9	16 13.08	59 31.34	0.518	11.4 L 29 09 56.6	2.19
	29.5	219 27 13.2	-2 16 07.4	16 11.05	59 23.88	-0.725	U 29 22 23.3	2.26
	30.0	226 34 28.1	2 49 09.4	16 08.34	59 13.94	0.930	12.4 L 30 10 50.8	2.33
	30.5	233 39 40.2	3 19 22.1	16 04.97	59 01.60	1.125	U 30 23 19.1	2.39
	31.0	240 42 13.7	3 46 18.1	16 01.00	58 47.00	1.305	13.4 L 31 11 48.1	2.44
	31.5	247 41 33.3	4 09 35.3	15 56.47	58 30.36	1.464	..	..
June	1.0	254 37 06.4	-4 28 56.9	15 51.46	58 11.98	-1.596	14.4 U 1 00 17.6	2.47
	1.5	261 28 23.4	4 44 11.7	15 46.06	57 52.19	1.697	L 1 12 47.4	2.48
	2.0	268 15 00.1	4 55 13.9	15 40.39	57 31.38	1.766	15.4 U 2 01 17.1	2.47
	2.5	274 56 37.8	5 02 02.8	15 34.56	57 09.95	1.800	L 2 13 46.6	2.43
	3.0	281 33 04.2	5 04 42.4	15 28.67	56 48.33	1.798	16.4 U 3 02 15.4	2.37
	3.5	288 04 13.9	-5 03 20.3	15 22.84	56 26.94	-1.762	L 3 14 43.5	2.30
	4.0	294 30 08.1	4 58 07.0	15 17.18	56 06.15	1.695	17.4 U 4 03 10.5	2.20
	4.5	300 50 55.0	4 49 15.7	15 11.78	55 46.36	1.598	L 4 15 36.4	2.11
	5.0	307 06 48.7	4 37 01.0	15 06.76	55 27.91	1.474	18.4 U 5 04 01.2	2.02
	5.5	313 18 09.2	4 21 38.5	15 02.18	55 11.09	1.326	L 5 16 24.9	1.94
	6.0	319 25 21.5	-4 03 24.4	14 58.11	54 56.18	-1.157	19.4 U 6 04 47.7	1.86
	6.5	325 28 54.9	3 42 35.4	14 54.62	54 43.38	0.973	L 6 17 09.5	1.78
	7.0	331 29 22.2	3 19 27.9	14 51.76	54 32.87	0.776	20.4 U 7 05 30.5	1.73
	7.5	337 27 19.3	2 54 18.2	14 49.56	54 24.78	0.570	L 7 17 50.9	1.68
	8.0	343 23 23.9	2 27 22.5	14 48.04	54 19.22	0.357	21.4 U 8 06 10.9	1.65
	8.5	349 18 15.6	-1 58 56.7	14 47.23	54 16.22	-0.141	L 8 18 30.5	1.63
	9.0	355 12 34.5	-1 29 17.0	14 47.12	54 15.82	+0.074	22.4 U 9 06 49.9	1.62

Date.	Longitude.	Latitude.	Semi-diameter.	Horizontal Parallax.	Var. per Hour.	Age.	Transit, Meridian of Greenwich.	Var. per Hour	
June	9 ^h 0 ^m	355 12 34.5	-1 29 17.0	14 47.12	54 15.82	+0.074	22.4	U 9 06 49.9 L 9 19 09.4	1.62 1.63
	9.5	1 07 01.3	0 58 39.5	14 47.71	54 17.98	0.285		U 10 07 28.9	1.64
	10.0	7 02 16.0	-0 27 20.5	14 48.98	54 22.65	0.491	23.4	L 10 19 48.7	1.67
	10.5	12 58 57.8	+0 04 22.9	14 50.90	54 29.72	0.687		U 11 08 09.0	1.72
	11.0	18 57 44.6	0 36 12.9	14 53.45	54 39.08	0.870	24.4	L 11 20 29.9	1.77
	11.5	24 59 11.8	+1 07 51.1	14 56.57	54 50.54	+1.038		U 12 08 51.5	1.84
	12.0	31 03 52.2	1 38 57.8	15 00.22	55 03.92	1.188	25.4	L 12 21 14.0	1.91
	12.5	37 12 14.9	2 09 12.3	15 04.32	55 18.97	1.317		U 13 09 37.4	2.00
	13.0	43 24 45.2	2 38 13.0	15 08.81	55 35.45	1.423	26.4	L 13 22 02.0	2.10
	13.5	49 41 43.6	3 05 37.1	15 13.60	55 53.04	1.504		U 14 10 27.8	2.20
	14.0	56 03 25.3	+3 31 01.2	15 18.62	56 11.45	+1.559	27.4	L 14 22 54.7	2.29
	14.5	62 29 59.4	3 54 01.7	15 23.77	56 30.34	1.586		U 15 11 22.8	2.38
	15.0	69 01 29.2	4 14 15.0	15 28.96	56 49.40	1.585	28.4	L 15 23 51.8	2.45
	15.5	75 37 51.5	4 31 18.2	15 34.10	57 08.27	1.557		..	..
	16.0	82 18 56.8	4 44 50.2	15 39.11	57 26.65	1.502	29.4	U 16 12 21.5	2.50
	16.5	89 04 29.6	+4 54 32.0	15 43.90	57 44.23	+1.424		L 17 00 51.7	2.52
	17.0	95 54 09.2	5 00 07.6	15 48.40	58 00.75	1.325	0.9	U 17 13 22.0	2.51
	17.5	102 47 30.3	5 01 24.9	15 52.54	58 15.97	1.209		L 18 01 52.0	2.48
	18.0	109 44 04.3	4 58 16.5	15 56.29	58 29.72	1.081	1.9	U 18 14 21.6	2.44
	18.5	116 43 20.4	4 50 39.8	15 59.60	58 41.86	0.943		L 19 02 50.5	2.37
	19.0	123 44 47.2	+4 38 37.2	16 02.45	58 52.32	+0.800	2.9	U 19 15 18.5	2.30
	19.5	130 47 53.7	4 22 17.1	16 04.83	59 01.05	0.656		L 20 03 45.6	2.22
	20.0	137 52 10.7	4 01 52.5	16 06.74	59 08.06	0.514	3.9	U 20 16 11.8	2.15
	20.5	144 57 11.7	3 37 41.6	16 08.19	59 13.41	0.377		L 21 04 37.3	2.09
	21.0	152 02 33.6	3 10 06.8	16 09.21	59 17.15	0.247	4.9	U 21 17 02.0	2.04
	21.5	159 07 57.1	+2 39 34.6	16 09.82	59 19.37	+0.125		L 22 05 26.3	2.01
	22.0	166 13 06.2	2 06 34.4	16 10.03	59 20.17	+0.008	5.9	U 22 17 50.2	1.98
	22.5	173 17 48.5	1 31 38.2	16 09.88	59 19.60	-0.102		L 23 06 13.9	1.98
	23.0	180 21 54.5	0 55 19.8	16 09.38	59 17.75	0.205	6.9	U 23 18 37.7	1.99
	23.5	187 25 16.5	+0 18 14.1	16 08.54	59 14.69	0.305		L 24 07 01.6	2.01
	24.0	194 27 48.2	-0 19 03.7	16 07.38	59 10.44	-0.403	7.9	U 24 19 25.9	2.05
	24.5	201 29 23.4	0 55 58.1	16 05.91	59 05.01	0.501		L 25 07 50.7	2.10
	25.0	208 29 55.3	1 31 54.8	16 04.11	58 58.42	0.598	8.9	U 25 20 16.2	2.15
	25.5	215 29 15.9	2 06 20.5	16 01.99	58 50.66	0.696		L 26 08 42.4	2.22
	26.0	222 27 15.2	2 38 44.1	15 59.56	58 41.71	0.795	9.9	U 26 21 09.5	2.29
	26.5	229 23 40.8	-3 08 37.0	15 56.79	58 31.57	-0.895		L 27 09 37.3	2.35
	27.0	236 18 18.1	3 35 33.5	15 53.71	58 20.23	0.993	10.9	U 27 22 05.8	2.40
	27.5	243 10 50.5	3 59 11.5	15 50.30	58 07.74	1.088		L 28 10 34.8	2.43
	28.0	250 00 59.3	4 19 13.1	15 46.60	57 54.15	1.177	11.9	U 28 23 04.2	2.45
	28.5	256 48 25.1	4 35 24.2	15 42.62	57 39.54	1.257		L 29 11 33.6	2.44
	29.0	263 32 47.9	-4 47 35.9	15 38.39	57 24.02	-1.326	12.9	..	..
	29.5	270 13 49.0	4 55 43.1	15 33.96	57 07.76	1.381		U 30 00 02.7	2.41
	30.0	276 51 10.9	4 59 45.3	15 29.38	56 50.95	1.418	13.9	L 30 12 31.4	2.35
	30.5	283 24 39.1	4 59 46.1	15 24.71	56 33.80	1.437		U 1 00 59.2	2.28
July	1.0	289 54 02.4	4 55 52.6	15 20.01	56 16.56	1.434	14.9	L 1 13 26.1	2.20
	1.5	296 19 13.9	-4 48 15.0	15 15.36	55 59.48	-1.409		U 2 01 52.0	2.11
2.0	302 40 11.4	-4 37 06.3	15 10.82	55 42.84	-1.361	15.9			

Date.	Longitude.	Latitude.	Semi-diameter.	Horizontal Parallax.	Var. per Hour.	Age.	Transit, Meridian of Greenwich.	Var. per Hour
July 1.0	289° 54' 02".4	-4° 55' 52".6	15' 20".01	56' 16".56	-1".434	14.9	U 1 00 59.2	2.28
1.5	296 19 13.9	4 48 15.0	15 15.36	55 59.48	1.409		L 1 13 26.1	2.20
2.0	302 40 11.4	4 37 06.3	15 10.82	55 42.84	1.361	15.9	U 2 01 52.0	2.11
2.5	308 56 57.6	4 22 41.3	15 06.48	55 26.91	1.290		L 2 14 16.7	2.02
3.0	315 09 40.7	4 05 16.2	15 02.41	55 11.97	1.196	16.9	U 3 02 40.4	1.94
3.5	321 18 33.3	-3 45 08.3	14 58.68	54 58.28	-1.082		L 3 15 03.2	1.86
4.0	327 23 53.6	3 22 35.3	14 55.36	54 46.09	0.947	17.9	U 4 03 25.0	1.79
4.5	333 26 03.9	2 57 55.1	14 52.51	54 35.62	0.794		L 4 15 46.1	1.73
5.0	339 25 30.6	2 31 25.8	14 50.19	54 27.09	0.625	18.9	U 5 04 06.5	1.68
5.5	345 22 44.2	2 03 24.8	14 48.44	54 20.68	0.442		L 5 16 26.4	1.65
6.0	351 18 17.9	-1 34 09.6	14 47.31	54 16.53	-0.247	19.9	U 6 04 46.0	1.63
6.5	357 12 47.9	1 03 57.3	14 46.83	54 14.78	-0.043		L 6 17 05.5	1.62
7.0	3 06 52.4	0 33 04.8	14 47.03	54 15.51	+0.167	20.9	U 7 05 24.8	1.62
7.5	9 01 11.3	-0 01 49.0	14 47.93	54 18.79	0.380		L 7 17 44.3	1.64
8.0	14 56 25.5	+0 29 33.3	14 49.52	54 24.63	0.594	21.9	U 8 06 04.1	1.67
8.5	20 53 16.2	+1 00 44.7	14 51.80	54 33.02	+0.805		L 8 18 24.3	1.70
9.0	26 52 24.4	1 31 27.5	14 54.77	54 43.92	1.010	22.9	U 9 06 45.0	1.76
9.5	32 54 30.4	2 01 23.4	14 58.39	54 57.21	1.204		L 9 19 06.5	1.83
10.0	39 00 12.7	2 30 13.0	15 02.63	55 12.76	1.385	23.9	U 10 07 28.9	1.91
10.5	45 10 07.2	2 57 36.3	15 07.43	55 30.38	1.548		L 10 19 52.3	2.00
11.0	51 24 46.3	+3 23 12.1	15 12.73	55 49.83	+1.689	24.9	U 11 08 16.9	2.10
11.5	57 44 38.1	3 46 38.4	15 18.45	56 10.82	1.804		L 11 20 42.6	2.20
12.0	64 10 05.2	4 07 32.8	15 24.49	56 33.01	1.889	25.9	U 12 09 09.6	2.30
12.5	70 41 24.0	4 25 32.3	15 30.76	56 56.02	1.939		L 12 21 37.7	2.39
13.0	77 18 43.2	4 40 14.5	15 37.13	57 19.41	1.953	26.9	U 13 10 06.9	2.47
13.5	84 02 03.6	+4 51 17.8	15 43.49	57 42.74	+1.928		L 13 22 36.9	2.53
14.0	90 51 17.3	4 58 22.8	15 49.70	58 05.52	1.862	27.9	U 14 11 07.5	2.55
14.5	97 46 07.3	5 01 12.6	15 55.62	58 27.27	1.757		L 14 23 38.2	2.55
15.0	104 46 08.5	4 59 34.5	16 01.14	58 47.53	1.613	28.9	.. ..	..
15.5	111 50 47.3	4 53 20.6	16 06.13	59 05.85	1.434		U 15 12 08.7	2.53
16.0	118 59 23.6	+4 42 28.5	16 10.49	59 21.84	+1.227	0.5	L 16 00 38.9	2.48
16.5	126 11 11.8	4 27 02.5	16 14.13	59 35.20	0.997		U 16 13 08.3	2.41
17.0	133 25 23.4	4 07 13.5	16 16.99	59 45.71	0.752	1.5	L 17 01 36.8	2.33
17.5	140 41 08.3	3 43 18.8	16 19.04	59 53.23	0.500		U 17 14 04.3	2.27
18.0	147 57 37.7	3 15 41.9	16 20.26	59 57.71	0.249	2.5	L 18 02 31.2	2.20
18.5	155 14 05.4	+2 44 51.7	16 20.68	59 59.23	+0.006		U 18 14 57.1	2.13
19.0	162 29 49.4	2 11 21.5	16 20.32	59 57.93	-0.221	3.5	L 19 03 22.3	2.08
19.5	169 44 13.3	1 35 47.6	16 19.25	59 54.00	0.429		U 19 15 47.0	2.04
20.0	176 56 47.3	0 58 48.2	16 17.54	59 47.72	0.613	4.5	L 20 04 11.3	2.02
20.5	184 07 07.4	+0 21 02.2	16 15.27	59 39.39	0.771		U 20 16 35.4	2.00
21.0	191 14 55.9	-0 16 51.8	16 12.53	59 29.32	-0.903	5.5	L 21 04 59.4	2.01
21.5	198 20 00.7	0 54 16.6	16 09.40	59 17.82	1.010		U 21 17 23.6	2.03
22.0	205 22 14.2	1 30 37.1	16 05.95	59 05.18	1.094	6.5	L 22 05 48.2	2.07
22.5	212 21 32.7	2 05 20.6	16 02.27	58 51.66	1.158		U 22 18 13.2	2.11
23.0	219 17 54.8	2 37 57.4	15 58.40	58 37.47	1.204	7.5	L 23 06 38.8	2.16
23.5	226 11 21.2	-3 08 01.1	15 54.41	58 22.82	-1.235		U 23 19 05.0	2.22
24.0	233 01 52.7	-3 35 08.7	15 50.34	58 07.87	-1.256	8.5	L 24 07 32.0	2.28

Date.	Longitude.	Latitude.	Semi-diameter.	Horizontal Parallax.	Var. per Hour.	Age.	Transit, Meridian of Greenwich.	Var. per Hour
July 24.0	233 01 52.7	-3 35 08.7	15 50.34	58 07.87	-1.256	8.5	L 24 07 32.0 U 24 19 59.6	2.28 2.33
24.5	239 49 30.7	3 59 00.6	15 46.21	57 52.71	1.268		L 25 08 27.9 U 25 20 56.5	2.37 2.40
25.0	246 34 15.4	4 19 20.9	15 42.05	57 37.47	1.273	9.5	L 26 09 25.4	2.40
25.5	253 16 06.4	4 35 57.2	15 37.89	57 22.18	1.274			
26.0	259 55 02.3	4 48 40.8	15 33.73	57 06.91	1.270	10.5		
26.5	266 31 00.2	-4 57 26.5	15 29.59	56 51.70	-1.263		U 26 21 54.2	2.39
27.0	273 03 56.5	5 02 12.7	15 25.47	56 36.60	1.253	11.5	L 27 10 22.8	2.36
27.5	279 33 47.2	5 03 00.9	15 21.40	56 21.66	1.237		U 27 22 50.8	2.30
28.0	286 00 28.2	4 59 56.1	15 17.39	56 06.93	1.216	12.5	L 28 11 18.1	2.23
28.5	292 23 55.9	4 53 06.0	15 13.45	55 52.50	1.189		U 28 23 44.4	2.15
29.0	298 44 07.6	-4 42 41.1	15 09.62	55 38.43	-1.154	13.5		
29.5	305 01 02.7	4 28 54.1	15 05.92	55 24.84	1.109		L 29 12 09.8	2.08
30.0	311 14 42.2	4 11 59.8	15 02.39	55 11.87	1.053	14.5	U 30 00 34.2	1.99
30.5	317 25 10.0	3 52 14.4	14 59.05	54 59.63	0.985		L 30 12 57.6	1.91
31.0	323 32 33.2	3 29 55.3	14 55.96	54 48.29	0.903	15.5	U 31 01 20.1	1.84
Aug. 31.5	329 37 01.5	-3 05 20.8	14 53.16	54 38.02	-0.807		L 31 13 41.7	1.77
1.0	335 38 48.4	2 38 49.6	14 50.70	54 28.97	0.698	16.5	U 1 02 02.6	1.72
1.5	341 38 11.0	2 10 40.5	14 48.62	54 21.33	0.573		L 1 14 23.0	1.68
2.0	347 35 29.4	1 41 12.5	14 46.97	54 15.28	0.434	17.5	U 2 02 42.8	1.64
2.5	353 31 07.3	1 10 44.2	14 45.80	54 10.97	0.281		L 2 15 02.4	1.63
3.0	359 25 31.4	-0 39 34.0	14 45.14	54 08.58	-0.115	18.5	U 3 03 21.8	1.61
3.5	5 19 11.7	-0 08 00.1	14 45.05	54 08.25	+0.062		L 3 15 41.1	1.62
4.0	11 12 40.5	+0 23 39.8	14 45.56	54 10.11	0.249	19.5	U 4 04 00.6	1.63
4.5	17 06 32.5	0 55 08.2	14 46.69	54 14.27	0.446		L 4 16 20.3	1.66
5.0	23 01 24.4	1 26 07.4	14 48.48	54 20.83	0.649	20.5	U 5 04 40.4	1.70
5.5	28 57 54.5	+1 56 20.0	14 50.94	54 29.85	+0.855		L 5 17 01.0	1.75
6.0	34 56 42.1	2 25 28.3	14 54.07	54 41.35	1.062	21.5	U 6 05 22.4	1.82
6.5	40 58 26.7	2 53 14.2	14 57.88	54 55.32	1.267		L 6 17 44.6	1.89
7.0	47 03 48.1	3 19 18.8	15 02.35	55 11.72	1.465	22.5	U 7 06 07.7	1.98
7.5	53 13 24.6	3 43 23.2	15 07.44	55 30.43	1.652		L 7 18 32.0	2.07
8.0	59 27 52.7	+4 05 07.5	15 13.13	55 51.30	+1.823	23.5	U 8 06 57.4	2.17
8.5	65 47 46.1	4 24 11.1	15 19.34	56 14.11	1.974		L 8 19 24.0	2.26
9.0	72 13 34.2	4 40 13.4	15 26.01	56 38.58	2.099	24.5	U 9 07 51.7	2.35
9.5	78 45 41.4	4 52 53.6	15 33.03	57 04.36	2.192		L 9 20 20.5	2.44
10.0	85 24 25.2	5 01 51.5	15 40.30	57 31.04	2.247	25.5	U 10 08 50.2	2.50
10.5	92 09 55.2	+5 06 48.1	15 47.68	57 58.12	+2.259		L 10 21 20.5	2.53
11.0	99 02 12.5	5 07 26.6	15 55.02	58 25.06	2.223	26.5	U 11 09 51.0	2.54
11.5	106 01 07.9	5 03 33.4	16 02.16	58 51.28	2.137		L 11 22 21.5	2.53
12.0	113 06 22.0	4 54 59.2	16 08.94	59 16.14	1.998	27.5	U 12 10 51.7	2.50
12.5	120 17 24.8	4 41 40.3	16 15.17	59 39.03	1.808		L 12 23 21.4	2.44
13.0	127 33 36.2	+4 23 39.6	16 20.71	59 59.35	+1.570	28.5	U 13 11 50.3	2.38
13.5	134 54 07.2	4 01 07.0	16 25.39	60 16.54	1.289			
14.0	142 18 01.9	3 34 20.6	16 29.10	60 30.15	0.974	0.1	L 14 00 18.4	2.31
14.5	149 44 19.0	3 03 45.8	16 31.74	60 39.83	0.636		U 14 12 45.7	2.24
15.0	157 11 54.7	2 29 54.9	16 33.25	60 45.38	+0.287	1.1	L 15 01 12.2	2.18
15.5	164 39 45.7	+1 53 26.0	16 33.62	60 46.72	-0.061		U 15 13 38.1	2.14
16.0	172 06 50.8	+1 15 01.6	16 32.86	60 43.95	-0.397	2.1	L 16 02 03.5	2.10

Date.	Longitude.	Latitude.	Semi-diameter.	Horizontal Parallax.	Var. per Hour.	Age.	Transit, Meridian of Greenwich.	Var. per Hour
Aug. 16.0	172 06 50.8	+1 15 01.6	16 32.86	60 43.95	-0.397	2.1	L 16 02 03.5	2.10
16.5	179 32 14.3	+0 35 26.9	16 31.05	60 37.30	0.708		U 16 14 28.5	2.08
17.0	186 55 06.2	-0 04 32.5	16 28.27	60 27.10	0.986	3.1	L 17 02 53.4	2.08
17.5	194 14 44.8	0 44 12.0	16 24.64	60 13.79	1.226		U 17 15 18.3	2.08
18.0	201 30 36.3	1 22 49.4	16 20.30	59 57.85	1.423	4.1	L 18 03 43.4	2.10
18.5	208 42 15.2	-1 59 46.1	16 15.39	59 39.82	-1.576		U 18 16 08.7	2.13
19.0	215 49 24.1	2 34 28.2	16 10.04	59 20.21	1.686	5.1	L 19 04 34.5	2.17
19.5	222 51 52.5	3 06 26.4	16 04.41	58 59.52	1.755		U 19 17 00.8	2.22
20.0	229 49 36.2	3 35 16.4	15 58.61	58 38.22	1.789	6.1	L 20 05 27.8	2.27
20.5	236 42 35.9	4 00 38.8	15 52.74	58 16.70	1.793		U 20 17 55.3	2.31
21.0	243 30 56.7	-4 22 18.8	15 46.91	57 55.30	-1.770	7.1	L 21 06 23.3	2.35
21.5	250 14 46.3	4 40 05.9	15 41.19	57 34.31	1.726		U 21 18 51.8	2.38
22.0	256 54 14.8	4 53 53.3	15 35.64	57 13.94	1.666	8.1	L 22 07 20.5	2.39
22.5	263 29 33.3	5 03 37.9	15 30.31	56 54.37	1.595		U 22 19 49.2	2.38
23.0	270 00 53.6	5 09 19.8	15 25.22	56 35.70	1.516	9.1	L 23 08 17.7	2.36
23.5	276 28 27.6	-5 11 01.4	15 20.40	56 18.00	-1.433		U 23 20 45.8	2.31
24.0	282 52 27.0	5 08 48.3	15 15.86	56 01.32	1.346	10.1	L 24 09 13.2	2.25
24.5	289 13 02.9	5 02 48.2	15 11.60	55 45.69	1.259		U 24 21 39.8	2.18
25.0	295 30 26.0	4 53 10.5	15 07.62	55 31.09	1.173	11.1	L 25 10 05.5	2.10
25.5	301 44 46.8	4 40 07.1	15 03.93	55 17.53	1.087		U 25 22 30.3	2.03
26.0	307 56 14.7	-4 23 51.1	15 00.52	55 05.00	-1.002	12.1	L 26 10 54.1	1.95
26.5	314 04 59.9	4 04 37.4	14 57.38	54 53.49	0.917		U 26 23 17.0	1.87
27.0	320 11 12.0	3 42 42.2	14 54.52	54 43.00	0.831	13.1	L 27 11 39.0	1.80
27.5	326 15 01.5	3 18 22.6	14 51.95	54 33.56	0.743		..	..
28.0	332 16 39.1	2 51 56.6	14 49.67	54 25.18	0.652	14.1	U 28 00 00.3	1.75
28.5	338 16 17.0	-2 23 43.1	14 47.69	54 17.92	-0.558		L 28 12 20.9	1.70
29.0	344 14 08.4	1 54 01.0	14 46.03	54 11.82	0.456	15.1	U 29 00 41.0	1.66
29.5	350 10 28.0	1 23 10.0	14 44.71	54 07.00	0.347		L 29 13 00.8	1.63
30.0	356 05 32.5	0 51 29.4	14 43.76	54 03.52	0.231	16.1	U 30 01 20.2	1.62
30.5	1 59 40.3	-0 19 18.6	14 43.21	54 01.48	-0.106		L 30 13 39.6	1.61
31.0	7 53 11.8	+0 13 03.1	14 43.08	54 01.00	+0.029	17.1	U 31 01 58.9	1.63
31.5	13 46 29.9	0 45 16.9	14 43.41	54 02.20	0.173		L 31 14 18.4	1.63
Sept. 1.0	19 39 59.3	1 17 04.1	14 44.22	54 05.20	0.328	18.1	U 1 02 38.1	1.66
1.5	25 34 07.1	1 48 06.4	14 45.56	54 10.11	0.492		L 1 14 58.3	1.70
2.0	31 29 22.1	2 18 05.9	14 47.45	54 17.05	0.665	19.1	U 2 03 18.9	1.75
2.5	37 26 15.1	+2 46 44.5	14 49.92	54 26.10	+0.845		L 2 15 40.3	1.81
3.0	43 25 18.6	3 13 44.6	14 52.98	54 37.36	1.032	20.1	U 3 04 02.4	1.88
3.5	49 27 06.5	3 38 48.7	14 56.67	54 50.87	1.221		L 3 16 25.5	1.96
4.0	55 32 13.2	4 01 38.9	15 00.97	55 06.66	1.411	21.1	U 4 04 49.5	2.05
4.5	61 41 13.8	4 21 57.6	15 05.89	55 24.72	1.598		L 4 17 14.6	2.13
5.0	67 54 42.6	+4 39 26.8	15 11.41	55 44.99	+1.779	22.1	U 5 05 40.7	2.22
5.5	74 13 13.5	4 53 48.6	15 17.51	56 07.37	1.947		L 5 18 07.9	2.31
6.0	80 37 17.6	5 04 45.3	15 24.13	56 31.66	2.098	23.1	U 6 06 36.1	2.38
6.5	87 07 23.5	5 11 59.7	15 31.20	56 57.64	2.226		L 6 19 05.0	2.43
7.0	93 43 54.7	5 15 15.3	15 38.65	57 24.97	2.324	24.1	U 7 07 34.4	2.47
7.5	100 27 09.8	+5 14 17.2	15 46.36	57 53.27	+2.385		L 7 20 04.2	2.48
8.0	107 17 20.2	+5 08 53.1	15 54.20	58 22.04	+2.403	25.1	U 8 08 34.0	2.47

MOON, 1931.

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Date.	Longitude.	Latitude.	Semi-diameter.	Horizontal Parallax.	Var. per Hour.	Age.	Transit, Meridian of Greenwich.	Var. per Hour
Sept. 8.0	107 17 20.2	+5 08 53.1	15 54.20	58 22.04	+2.403	25.1	U 8 08 34.0	m 2.47
8.5	114 14 28.9	4 58 53.6	16 02.02	58 50.74	2.370		L 8 21 03.5	2.45
9.0	121 18 29.7	4 44 14.0	16 09.64	59 18.71	2.283	26.1	U 9 09 32.7	2.40
9.5	128 29 05.6	4 24 55.0	16 16.88	59 45.29	2.137		L 9 22 01.2	2.35
10.0	135 45 49.5	4 01 03.8	16 23.55	60 09.76	1.931	27.1	U 10 10 29.2	2.30
10.5	143 08 02.8	+3 32 55.2	16 29.44	60 31.41	+1.667		L 10 22 56.5	2.25
11.0	150 34 56.8	3 00 51.7	16 34.39	60 49.57	1.351	28.1	U 11 11 23.2	2.20
11.5	158 05 34.1	2 25 23.9	16 38.23	61 03.67	0.991		L 11 23 49.4	2.17
12.0	165 38 49.8	1 47 09.7	16 40.83	61 13.22	0.598	29.1	..	..
12.5	173 13 34.4	1 06 53.0	16 42.12	61 17.94	+0.187		U 12 12 15.3	2.15
13.0	180 48 36.3	+0 25 22.4	16 42.06	61 17.70	-0.226	0.8	L 13 00 41.0	2.14
13.5	188 22 44.3	-0 16 31.6	16 40.66	61 12.56	0.627		U 13 13 06.6	2.14
14.0	195 54 50.9	0 57 58.0	16 37.99	61 02.77	1.000	1.8	L 14 01 32.3	2.15
14.5	203 23 54.2	1 38 08.2	16 34.16	60 48.72	1.334		U 14 13 58.3	2.18
15.0	210 48 59.7	2 16 17.6	16 29.31	60 30.94	1.619	2.8	L 15 02 24.7	2.22
15.5	218 09 22.0	-2 51 47.4	16 23.62	60 10.05	-1.850		U 15 14 51.5	2.26
16.0	225 24 25.7	3 24 04.6	16 17.28	59 46.76	2.024	3.8	L 16 03 19.0	2.31
16.5	232 33 44.6	3 52 43.5	16 10.45	59 21.69	2.143		U 16 15 47.0	2.36
17.0	239 37 02.2	4 17 24.9	16 03.32	58 55.53	2.209	4.8	L 17 04 15.6	2.40
17.5	246 34 10.8	4 37 56.0	15 56.06	58 28.87	2.227		U 17 16 44.6	2.43
18.0	253 25 10.6	-4 54 09.5	15 48.80	58 02.24	-2.203	5.8	L 18 05 13.8	2.44
18.5	260 10 08.2	5 06 03.2	15 41.69	57 36.13	2.143		U 18 17 43.1	2.44
19.0	266 49 15.8	5 13 38.5	15 34.82	57 10.92	2.056	6.8	L 19 06 12.3	2.41
19.5	273 22 50.0	5 17 00.7	15 28.27	56 46.89	1.946		U 19 18 40.9	2.36
20.0	279 51 10.6	5 16 17.4	15 22.11	56 24.28	1.820	7.8	L 20 07 08.9	2.30
20.5	286 14 39.6	-5 11 38.4	15 16.38	56 03.24	-1.684		U 20 19 36.1	2.23
21.0	292 33 40.2	5 03 15.1	15 11.11	55 43.89	1.541	8.8	L 21 08 02.4	2.15
21.5	298 48 36.5	4 51 20.3	15 06.31	55 26.27	1.395		U 21 20 27.7	2.06
22.0	304 59 52.4	4 36 07.9	15 01.99	55 10.40	1.249	9.8	L 22 08 51.9	1.98
22.5	311 07 51.7	4 17 52.7	14 58.14	54 56.28	1.106		U 22 21 15.2	1.90
23.0	317 12 57.3	-3 56 50.4	14 54.75	54 43.84	-0.967	10.8	L 23 09 37.6	1.83
23.5	323 15 31.6	3 33 17.3	14 51.81	54 33.04	0.833		U 23 21 59.2	1.77
24.0	329 15 55.4	3 07 30.4	14 49.29	54 23.81	0.705	11.8	L 24 10 20.1	1.72
24.5	335 14 28.7	2 39 47.3	14 47.19	54 16.09	0.582		U 24 22 40.4	1.68
25.0	341 11 30.7	2 10 26.3	14 45.48	54 09.81	0.464	12.8	L 25 11 00.3	1.64
25.5	347 07 19.5	-1 39 45.9	14 44.15	54 04.93	-0.351		U 25 23 19.8	1.62
26.0	353 02 12.5	1 08 05.3	14 43.18	54 01.38	0.241	13.8	L 26 11 39.2	1.61
26.5	358 56 26.6	0 35 43.9	14 42.57	53 59.14	0.132		U 26 23 58.5	1.61
27.0	4 50 18.6	-0 03 01.2	14 42.31	53 58.20	-0.024	14.8	..	..
27.5	10 44 04.8	+0 29 43.2	14 42.41	53 58.56	+0.085		L 27 12 17.9	1.63
28.0	16 38 01.9	+1 02 09.5	14 42.87	54 00.24	+0.195	15.8	U 28 00 37.5	1.65
28.5	22 32 27.4	1 33 58.3	14 43.69	54 03.26	0.310		L 28 12 57.4	1.68
29.0	28 27 39.0	2 04 50.3	14 44.90	54 07.70	0.430	16.8	U 29 01 17.7	1.72
29.5	34 23 55.5	2 34 26.7	14 46.51	54 13.60	0.555		L 29 13 38.6	1.77
30.0	40 21 36.8	3 02 28.8	14 48.54	54 21.04	0.687	17.8	U 30 02 00.2	1.83
30.5	46 21 03.6	+3 28 38.7	14 51.01	54 30.11	+0.825		L 30 14 22.6	1.90
Oct. 1.0	52 22 38.4	+3 52 38.9	14 53.94	54 40.86	+0.969	18.8	U 1 02 45.8	1.97

Date.	Longitude.	Latitude.	Semi-diameter.	Horizontal Parallax.	Var. per Hour.	Age.	Transit, Meridian of Greenwich.	Var. per Hour
Oct. 1-0	52° 22' 38".4	+3° 52' 38".9	14' 53".94	54' 40".86	+0".969	18.8	U 1 02 45.8 L 1 15 09.9	1.97 2.05
1-5	58 26 44.3	4 14 12.3	14 57.35	54 53.38	1.119			
2-0	64 33 46.0	4 33 02.6	15 01.26	55 07.73	1.273	19.8	U 2 03 35.0 L 2 16 01.1	2.13 2.21
2-5	70 44 09.0	4 48 53.9	15 05.68	55 23.95	1.429			
3-0	76 58 19.4	5 01 31.1	15 10.60	55 42.04	1.585	20.8	U 3 04 28.0	2.27
3-5	83 16 43.5	+5 10 39.8	15 16.04	56 01.98	+1.738		L 3 16 55.6	2.33
4-0	89 39 47.5	5 16 06.3	15 21.96	56 23.71	1.883	21.8	U 4 05 23.9	2.37
4-5	96 07 56.6	5 17 38.5	15 28.33	56 47.11	2.014		L 4 17 52.5	2.39
5-0	102 41 34.2	5 15 05.4	15 35.11	57 11.98	2.128	22.8	U 5 06 21.3	2.40
5-5	109 21 01.0	5 08 18.4	15 42.22	57 38.09	2.217		L 5 18 50.0	2.38
6-0	116 06 34.0	+4 57 11.1	15 49.58	58 05.08	+2.275	23.8	U 6 07 18.4	2.35
6-5	122 58 25.1	4 41 40.7	15 57.06	58 32.54	2.295		L 6 19 46.5	2.32
7-0	129 56 40.2	4 21 48.3	16 04.53	58 59.98	2.269	24.8	U 7 08 14.1	2.28
7-5	137 01 17.4	3 57 40.2	16 11.84	59 26.80	2.192		L 7 20 41.1	2.23
8-0	144 12 06.7	3 29 28.4	16 18.81	59 52.38	2.060	25.8	U 8 09 07.7	2.20
8-5	151 28 48.4	+2 57 31.3	16 25.25	60 16.02	+1.870		L 8 21 33.8	2.16
9-0	158 50 52.7	2 22 14.8	16 30.97	60 37.02	1.621	26.8	U 9 09 59.6	2.14
9-5	166 17 39.8	1 44 11.4	16 35.79	60 54.70	1.317		L 9 22 25.2	2.13
10-0	173 48 19.9	1 04 00.6	16 39.53	61 08.43	0.964	27.8	U 10 10 50.7	2.13
10-5	181 21 54.5	+0 22 27.4	16 42.06	61 17.70	0.574		L 10 23 16.4	2.15
11-0	188 57 18.1	-0 19 38.9	16 43.26	61 22.12	+0.160	28.8	U 11 11 42.4	2.18
11-5	196 33 19.9	1 01 26.9	16 43.09	61 21.49	-0.264		..	..
12-0	204 08 46.8	1 42 05.1	16 41.54	61 15.80	0.682	0.5	L 12 00 08.8	2.22
12-5	211 42 26.2	2 20 44.6	16 38.66	61 05.23	1.076		U 12 12 35.7	2.28
13-0	219 13 08.7	2 56 41.0	16 34.54	60 50.14	1.433	1.5	L 13 01 03.4	2.33
13-5	226 39 50.6	-3 29 16.1	16 29.34	60 31.03	-1.742		U 13 13 31.7	2.39
14-0	234 01 36.5	3 57 59.1	16 23.21	60 08.54	1.996	2.5	L 14 02 00.8	2.45
14-5	241 17 40.4	4 22 27.2	16 16.36	59 43.37	2.189		U 14 14 30.5	2.49
15-0	248 27 27.3	4 42 25.5	16 08.97	59 16.26	2.321	3.5	L 15 03 00.6	2.52
15-5	255 30 32.9	4 57 46.3	16 01.25	58 47.91	2.395		U 15 15 31.0	2.53
16-0	262 26 43.9	-5 08 28.7	15 53.37	58 19.00	-2.414	4.5	L 16 04 01.3	2.51
16-5	269 15 56.9	5 14 36.8	15 45.52	57 50.17	2.384		U 16 16 31.3	2.48
17-0	275 58 17.5	5 16 19.2	15 37.83	57 21.96	2.313	5.5	L 17 05 00.7	2.41
17-5	282 33 59.4	5 13 47.6	15 30.43	56 54.81	2.206		U 17 17 29.2	2.33
18-0	289 03 22.7	5 07 16.3	15 23.43	56 29.12	2.072	6.5	L 18 05 56.7	2.24
18-5	295 26 52.2	-4 57 00.8	15 16.91	56 05.16	-1.917		U 18 18 23.0	2.15
19-0	301 44 56.9	4 43 17.7	15 10.91	55 43.17	1.747	7.5	L 19 06 48.3	2.06
19-5	307 58 08.3	4 26 24.3	15 05.49	55 23.28	1.567		U 19 19 12.4	1.97
20-0	314 06 59.6	4 06 37.7	15 00.68	55 05.59	1.381	8.5	L 20 07 35.5	1.88
20-5	320 12 04.7	3 44 15.6	14 56.46	54 50.13	1.195		U 20 19 57.6	1.81
21-0	326 13 57.5	-3 19 35.4	14 52.86	54 36.91	-1.010	9.5	L 21 08 19.0	1.75
21-5	332 13 11.2	2 52 54.6	14 49.86	54 25.88	0.830		U 21 20 39.6	1.70
22-0	338 10 18.3	2 24 30.8	14 47.43	54 16.96	0.657	10.5	L 22 08 59.7	1.66
22-5	344 05 49.4	1 54 41.7	14 45.55	54 10.07	0.492		U 22 21 19.4	1.63
23-0	350 00 13.5	1 23 45.0	14 44.20	54 05.12	0.336	11.5	L 23 09 38.9	1.62
23-5	355 53 57.9	-0 51 59.1	14 43.34	54 01.98	-0.189		U 23 21 58.2	1.61
24-0	1 47 27.9	-0 19 42.5	14 42.95	54 00.54	-0.053	12.5	L 24 10 17.5	1.62

Date.	Longitude.	Latitude.	Semi-diameter.	Horizontal Parallax.	Var. per Hour.	Age.	Transit, Meridian of Greenwich.	Var. per Hour
	[°] ['] ["]	[°] ['] ["]	['] ["]	['] ["]	[°] ['] ["]	^d	^d ^h ^m	^m
Oct. 24.0	1 47 27.9	-0 19 42.5	14 42.95	54 00.54	-0.053	12.5	L 24 10 17.5	1.62
24.5	7 41 06.1	+0 12 46.0	14 42.99	54 00.68	+0.075		U 24 22 37.0	1.63
25.0	13 35 13.7	0 45 07.3	14 43.43	54 02.30	0.193	13.5	L 25 10 56.7	1.66
25.5	19 30 09.8	1 17 02.1	14 44.24	54 05.28	0.303		U 25 23 16.8	1.70
26.0	25 26 11.4	1 48 10.7	14 45.40	54 09.54	0.406	14.5	L 26 11 37.4	1.75
26.5	31 23 34.2	+2 18 13.6	14 46.89	54 15.01	+0.505		U 26 23 58.7	1.80
27.0	37 22 32.1	2 46 51.3	14 48.70	54 21.63	0.599	15.5	..	..
27.5	43 23 17.9	3 13 44.6	14 50.80	54 29.35	0.689		L 27 12 20.7	1.87
28.0	49 26 03.8	3 38 34.9	14 53.20	54 38.16	0.779	16.5	U 28 00 43.5	1.94
28.5	55 31 01.3	4 01 04.1	14 55.89	54 48.04	0.869		L 28 13 07.3	2.02
29.0	61 38 21.2	+4 20 55.1	14 58.88	54 59.02	+0.960	17.5	U 29 01 31.9	2.09
29.5	67 48 14.7	4 37 51.9	15 02.18	55 11.10	1.054		L 29 13 57.4	2.16
30.0	74 00 53.6	4 51 39.7	15 05.78	55 24.31	1.150	18.5	U 30 02 23.8	2.23
30.5	80 16 29.5	5 02 05.1	15 09.70	55 38.69	1.248		L 30 14 50.9	2.28
31.0	86 35 15.1	5 08 56.1	15 13.94	55 54.26	1.347	19.5	U 31 03 18.6	2.32
31.5	92 57 23.8	+5 12 02.7	15 18.50	56 11.03	+1.447		L 31 15 46.6	2.35
Nov. 1.0	99 23 09.7	5 11 16.6	15 23.40	56 28.99	1.546	20.5	U 1 04 14.9	2.35
1.5	105 52 47.2	5 06 31.8	15 28.61	56 48.11	1.640		L 1 16 43.0	2.33
2.0	112 26 31.5	4 57 44.5	15 34.11	57 08.32	1.726	21.5	U 2 05 10.9	2.31
2.5	119 04 37.1	4 44 53.6	15 39.88	57 29.48	1.800		L 2 17 38.4	2.27
3.0	125 47 18.0	+4 28 00.9	15 45.86	57 51.44	+1.857	22.5	U 3 06 05.4	2.23
3.5	132 34 46.6	4 07 11.6	15 52.00	58 13.96	1.892		L 3 18 31.8	2.18
4.0	139 27 12.9	3 42 34.8	15 58.20	58 36.73	1.898	23.5	U 4 06 57.7	2.14
4.5	146 24 43.5	3 14 23.8	16 04.37	58 59.37	1.870		L 4 19 23.2	2.10
5.0	153 27 20.3	2 42 56.4	16 10.38	59 21.45	1.803	24.5	U 5 07 48.2	2.08
5.5	160 34 59.5	+2 08 35.8	16 16.11	59 42.46	+1.692		L 5 20 13.0	2.06
6.0	167 47 30.1	1 31 50.4	16 21.39	60 01.86	1.533	25.5	U 6 08 37.7	2.06
6.5	175 04 33.4	0 53 13.7	16 26.08	60 19.07	1.327		L 6 21 02.4	2.07
7.0	182 25 42.0	+0 13 24.1	16 30.02	60 33.53	1.075	26.5	U 7 09 27.4	2.10
7.5	189 50 19.6	-0 26 55.8	16 33.07	60 44.71	0.780		L 7 21 52.8	2.14
8.0	197 17 40.6	-1 07 00.6	16 35.08	60 52.10	+0.448	27.5	U 8 10 18.8	2.20
8.5	204 46 51.8	1 46 03.3	16 35.97	60 55.36	+0.091		L 8 22 45.5	2.26
9.0	212 16 52.8	2 23 17.4	16 35.66	60 54.25	-0.279	28.5	U 9 11 13.0	2.33
9.5	219 46 38.4	2 57 58.9	16 34.14	60 48.67	0.650		L 9 23 41.5	2.41
10.0	227 15 01.0	3 29 27.9	16 31.43	60 38.70	1.007	0.0	..	..
10.5	234 40 53.2	-3 57 10.6	16 27.59	60 24.59	-1.339		U 10 12 10.8	2.48
11.0	242 03 11.1	4 20 40.1	16 22.72	60 06.72	1.633	1.0	L 11 00 41.0	2.54
11.5	249 20 56.1	4 39 37.7	16 16.96	59 45.59	1.880		U 11 13 11.8	2.58
12.0	256 33 17.9	4 53 52.3	16 10.48	59 21.80	2.075	2.0	L 12 01 43.0	2.60
12.5	263 39 36.0	5 03 20.6	16 03.45	58 56.00	2.215		U 12 14 14.2	2.59
13.0	270 39 20.5	-5 08 05.9	15 56.05	58 28.86	-2.299	3.0	L 13 02 45.1	2.55
13.5	277 32 12.8	5 08 17.2	15 48.47	58 01.03	2.330		U 13 15 15.4	2.48
14.0	284 18 05.2	5 04 07.8	15 40.87	57 33.14	2.312	4.0	L 14 03 44.7	2.40
14.5	290 57 00.0	4 55 54.5	15 33.40	57 05.73	2.249		U 14 16 12.9	2.30
15.0	297 29 08.9	4 43 56.0	15 26.21	56 39.31	2.148	5.0	L 15 04 39.8	2.19
15.5	303 54 51.6	-4 28 32.4	15 19.40	56 14.30	-2.015		U 15 17 05.5	2.09
16.0	310 14 33.7	-4 10 04.3	15 13.06	55 51.05	-1.856	6.0	L 16 05 29.9	1.98

Date.	Longitude.	Latitude.	Semi-diameter.	Horizontal Parallax.	Var. per Hour.	Age.	Transit, Meridian of Greenwich.	Var. per Hour
Nov. 16 ^o	310 14 33.7	-4 10 04.3	15 13.06	55 51.05	-1.856	6.0	L 16 05 29.9	1.98
16.5	316 28 46.8	3 48 52.3	15 07.28	55 29.84	1.677		U 16 17 53.1	1.90
17.0	322 38 05.8	3 25 16.3	15 02.11	55 10.87	1.483	7.0	L 17 06 15.4	1.82
17.5	328 43 08.5	2 59 36.1	14 57.60	54 54.29	1.280		U 17 18 36.8	1.75
18.0	334 44 34.3	2 32 10.7	14 53.75	54 40.18	1.071	8.0	L 18 06 57.4	1.70
18.5	340 43 03.4	-2 03 18.6	14 50.59	54 28.59	-0.861		U 18 19 17.5	1.66
19.0	346 39 15.9	1 33 17.7	14 48.12	54 19.50	0.653	9.0	L 19 07 37.2	1.63
19.5	352 33 51.4	1 02 25.6	14 46.32	54 12.88	0.451		U 19 19 56.6	1.61
20.0	358 27 28.0	-0 30 59.9	14 45.16	54 08.65	0.256	10.0	L 20 08 15.9	1.61
20.5	4 20 42.0	+0 00 42.0	14 44.63	54 06.71	-0.070		U 20 20 35.3	1.62
21.0	10 14 07.5	+0 32 22.4	14 44.69	54 06.92	+0.104	11.0	L 21 08 54.8	1.64
21.5	16 08 16.8	1 03 43.5	14 45.30	54 09.15	0.265		U 21 21 14.6	1.67
22.0	22 03 37.9	1 34 27.0	14 46.41	54 13.23	0.413	12.0	L 22 09 34.9	1.72
22.5	28 00 36.8	2 04 14.5	14 47.98	54 19.00	0.546		U 22 21 55.8	1.77
23.0	33 59 36.0	2 32 47.0	14 49.97	54 26.28	0.665	13.0	L 23 10 17.4	1.83
23.5	40 00 54.5	+2 59 45.5	14 52.31	54 34.89	+0.768		U 23 22 39.8	1.90
24.0	46 04 47.8	3 24 50.8	14 54.97	54 44.66	0.858	14.0	L 24 11 03.1	1.98
24.5	52 11 28.1	3 47 44.2	14 57.91	54 55.43	0.934		U 24 23 27.4	2.07
25.0	58 21 04.2	4 08 07.3	15 01.07	55 07.04	0.998	15.0	L 25 11 52.7	2.14
25.5	64 33 42.1	4 25 42.6	15 04.42	55 19.33	1.051		..	..
26.0	70 49 24.7	+4 40 13.4	15 07.93	55 32.21	+1.094	16.0	U 26 00 18.8	2.21
26.5	77 08 12.8	4 51 25.2	15 11.57	55 45.56	1.129		L 26 12 45.8	2.28
27.0	83 30 05.3	4 59 05.0	15 15.31	55 59.29	1.159	17.0	U 27 01 13.5	2.33
27.5	89 54 59.9	5 03 02.2	15 19.14	56 13.36	1.184		L 27 13 41.7	2.36
28.0	96 22 53.6	5 03 08.8	15 23.04	56 27.69	1.206	18.0	U 28 02 10.1	2.37
28.5	102 53 43.5	+4 59 19.5	15 27.02	56 42.28	+1.225		L 28 14 38.5	2.36
29.0	109 27 27.0	4 51 32.3	15 31.06	56 57.09	1.243	19.0	U 29 03 06.7	2.33
29.5	116 04 02.4	4 39 48.0	15 35.15	57 12.12	1.260		L 29 15 34.4	2.28
30.0	122 43 29.3	4 24 11.2	15 39.29	57 27.32	1.275	20.0	U 30 04 01.5	2.23
30.5	129 25 48.9	4 04 49.5	15 43.48	57 42.69	1.286		L 30 16 28.0	2.18
Dec. 1.0	136 11 03.4	+3 41 54.0	15 47.69	57 58.17	+1.292	21.0	U 1 04 53.8	2.13
1.5	142 59 16.4	3 15 39.4	15 51.91	58 13.66	1.289		L 1 17 19.0	2.08
2.0	149 50 32.3	2 46 23.7	15 56.11	58 29.07	1.276	22.0	U 2 05 43.6	2.03
2.5	156 44 55.5	2 14 28.5	16 00.24	58 44.23	1.248		L 2 18 07.8	2.00
3.0	163 42 29.5	1 40 18.6	16 04.25	58 58.94	1.201	23.0	U 3 06 31.7	1.99
3.5	170 43 16.2	+1 04 22.4	16 08.07	59 12.95	+1.131		L 3 18 55.5	1.98
4.0	177 47 14.5	+0 27 11.3	16 11.62	59 25.98	1.036	24.0	U 4 07 19.3	2.00
4.5	184 54 19.4	-0 10 40.4	16 14.81	59 37.71	0.913		L 4 19 43.4	2.03
5.0	192 04 20.6	0 48 35.9	16 17.56	59 47.78	0.760	25.0	U 5 08 07.9	2.07
5.5	199 17 01.5	1 25 56.7	16 19.75	59 55.83	0.576		L 5 20 33.1	2.13
6.0	206 31 58.9	-2 02 03.6	16 21.29	60 01.50	+0.364	26.0	U 6 08 59.0	2.20
6.5	213 48 42.3	2 36 17.2	16 22.11	60 04.48	+0.128		L 6 21 25.8	2.28
7.0	221 06 34.1	3 07 59.8	16 22.11	60 04.50	-0.128	27.0	U 7 09 53.6	2.36
7.5	228 24 50.0	3 36 36.5	16 21.25	60 01.36	0.397		L 7 22 22.4	2.44
8.0	235 42 41.1	4 01 36.2	16 19.51	59 54.96	0.670	28.0	U 8 10 52.2	2.52
8.5	242 59 14.5	-4 22 33.5	16 16.88	59 45.31	-0.938		L 8 23 22.8	2.57
9.0	250 13 36.0	-4 39 08.9	16 13.40	59 32.51	-1.191	29.0	U 9 11 53.9	2.60

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Date.	Longitude.	Latitude.	Semi-diameter.	Horizontal Parallax.	Var. per Hour.	Age.	Transit, Meridian of Greenwich.	Var. per Hour
Dec. 9.0	250° 13' 36.0"	-4° 39' 08.9"	16' 13.40"	59' 32.51"	-1.191	29.0	U 9 11 53.9	2.60
9.5	257 24 52.3	4 51 09.5	16 09.12	59 16.80	1.422		..	..
10.0	264 32 13.2	4 58 29.8	16 04.13	58 58.51	1.622	0.6	L 10 00 25.3	2.61
10.5	271 34 54.3	5 01 10.7	15 58.55	58 38.02	1.786		U 10 12 56.5	2.58
11.0	278 32 18.0	4 59 19.3	15 52.50	58 15.80	1.909	1.6	L 11 01 27.2	2.52
11.5	285 23 55.6	-4 53 08.0	15 46.11	57 52.37	-1.989		U 11 13 57.0	2.44
12.0	292 09 27.4	4 42 53.1	15 39.54	57 28.24	2.025	2.6	L 12 02 25.7	2.34
12.5	298 48 43.7	4 28 54.4	15 32.92	57 03.94	2.019		U 12 14 53.2	2.23
13.0	305 21 43.6	4 11 33.6	15 26.38	56 39.95	1.973	3.6	L 13 03 19.3	2.13
13.5	311 48 35.6	3 51 13.3	15 20.06	56 16.74	1.890		U 13 15 44.2	2.03
14.0	318 09 35.9	-3 28 16.9	15 14.06	55 54.73	-1.774	4.6	L 14 04 07.9	1.93
14.5	324 25 07.5	3 03 06.9	15 08.49	55 34.27	1.630		U 14 16 30.4	1.84
15.0	330 35 39.3	2 36 05.8	15 03.43	55 15.69	1.463	5.6	L 15 04 52.1	1.77
15.5	336 41 44.9	2 07 34.6	14 58.94	54 59.23	1.277		U 15 17 13.0	1.71
16.0	342 44 01.3	1 37 53.7	14 55.09	54 45.09	1.077	6.6	L 16 05 33.2	1.67
16.5	348 43 08.6	-1 07 22.4	14 51.91	54 33.43	-0.866		U 16 17 53.0	1.64
17.0	354 39 48.0	0 36 18.9	14 49.44	54 24.34	0.649	7.6	L 17 06 12.5	1.62
17.5	0 34 42.1	-0 05 01.1	14 47.68	54 17.87	0.429		U 17 18 31.9	1.62
18.0	6 28 33.6	+0 26 14.2	14 46.63	54 14.05	-0.209	8.6	L 18 06 51.3	1.63
18.5	12 22 04.4	0 57 09.8	14 46.30	54 12.84	+0.006		U 18 19 10.9	1.65
19.0	18 15 55.6	+1 27 29.2	14 46.66	54 14.16	+0.214	9.6	L 19 07 30.8	1.68
19.5	24 10 46.5	1 56 55.5	14 47.69	54 17.94	0.414		U 19 19 51.2	1.72
20.0	30 07 14.1	2 25 11.7	14 49.35	54 24.04	0.600	10.6	L 20 08 12.1	1.78
20.5	36 05 52.4	2 52 00.5	14 51.60	54 32.27	0.771		U 20 20 33.9	1.85
21.0	42 07 12.2	3 17 04.2	14 54.38	54 42.47	0.926	11.6	L 21 08 56.5	1.92
21.5	48 11 40.5	+3 40 05.0	14 57.63	54 54.41	+1.061		U 21 21 20.0	2.00
22.0	54 19 39.9	4 00 44.8	15 01.29	55 07.85	1.175	12.6	L 22 09 44.6	2.09
22.5	60 31 28.1	4 18 45.7	15 05.29	55 22.53	1.268		U 22 22 10.2	2.18
23.0	66 47 18.0	4 33 50.1	15 09.56	55 38.19	1.337	13.6	L 23 10 36.8	2.26
23.5	73 07 17.0	4 45 41.5	15 14.01	55 54.53	1.383		U 23 23 04.4	2.33
24.0	79 31 27.4	+4 54 04.7	15 18.57	56 11.28	+1.405	14.6	L 24 11 32.6	2.38
24.5	85 59 46.2	4 58 46.6	15 23.17	56 28.17	1.405		..	..
25.0	92 32 06.0	4 59 36.3	15 27.74	56 44.93	1.385	15.6	U 25 00 01.4	2.40
25.5	99 08 14.8	4 56 26.2	15 32.21	57 01.33	1.345		L 25 12 30.3	2.41
26.0	105 47 57.2	4 49 12.3	15 36.52	57 17.16	1.290	16.6	U 26 00 59.3	2.40
26.5	112 30 55.1	+4 37 54.5	15 40.63	57 32.24	+1.221		L 26 13 27.9	2.36
27.0	119 16 49.2	4 22 36.9	15 44.49	57 46.42	1.142	17.6	U 27 01 56.0	2.31
27.5	126 05 19.3	4 03 28.3	15 48.09	57 59.61	1.056		L 27 14 23.4	2.25
28.0	132 56 06.0	3 40 41.6	15 51.40	58 11.75	0.967	18.6	U 28 02 50.1	2.19
28.5	139 48 51.2	3 14 34.0	15 54.41	58 22.80	0.876		L 28 15 16.0	2.13
29.0	146 43 18.9	+2 45 26.7	15 57.12	58 32.77	+0.786	19.6	U 29 03 41.1	2.07
29.5	153 39 15.7	2 13 44.2	15 59.55	58 41.67	0.698		L 29 16 05.7	2.03
30.0	160 36 31.0	1 39 54.3	16 01.69	58 49.53	0.612	20.6	U 30 04 29.8	1.99
30.5	167 34 56.8	1 04 27.2	16 03.55	58 56.37	0.529		L 30 16 53.5	1.97
31.0	174 34 27.3	+0 27 54.8	16 05.14	59 02.22	0.447	21.6	U 31 05 17.0	1.96
31.5	181 34 58.6	-0 09 09.2	16 06.47	59 07.09	+0.364		L 31 17 40.6	1.97
32.0	188 36 27.5	-0 46 10.4	16 07.52	59 10.95	+0.280	22.6	U 32 06 04.3	1.99

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Thursday, January 1.					Saturday, January 3.				
00	^h 03 ^m 21 ^s 48.02	2.2396	+21 21 12.8	+10.712	00	^h 05 19 01.78	2.6274	+27 30 21.6	+3.987
01	03 24 02.65	2.2480	21 31 52.6	10.613	01	05 21 39.61	2.6336	27 34 15.4	3.804
02	03 26 17.78	2.2566	21 42 26.4	10.513	02	05 24 17.81	2.6397	27 37 58.1	3.621
03	03 28 33.44	2.2652	21 52 54.2	10.412	03	05 26 56.37	2.6455	27 41 29.9	3.437
04	03 30 49.60	2.2737	22 03 15.8	10.308	04	05 29 35.27	2.6512	27 44 50.5	3.251
05	03 33 06.28	2.2823	22 13 31.2	10.204	05	05 32 14.51	2.6567	27 48 00.0	3.064
06	03 35 23.48	2.2910	22 23 40.3	10.096	06	05 34 54.07	2.6620	27 50 58.2	2.876
07	03 37 41.20	2.2996	22 33 42.9	9.988	07	05 37 33.93	2.6672	27 53 45.1	2.687
08	03 39 59.43	2.3083	22 43 38.9	9.878	08	05 40 14.15	2.6722	27 56 20.6	2.496
09	03 42 18.19	2.3170	22 53 28.2	9.765	09	05 42 54.61	2.6771	27 58 44.6	2.304
10	03 44 37.47	2.3257	23 03 10.7	9.652	10	05 45 35.38	2.6818	28 00 57.1	2.112
11	03 46 57.27	2.3343	23 12 46.4	9.536	11	05 48 16.42	2.6863	28 02 58.0	1.918
12	03 49 17.59	2.3430	23 22 15.0	9.418	12	05 50 57.73	2.6906	28 04 47.2	1.723
13	03 51 38.43	2.3518	23 31 36.6	9.299	13	05 53 39.29	2.6948	28 06 24.7	1.527
14	03 53 59.80	2.3605	23 40 50.9	9.177	14	05 56 21.10	2.6987	28 07 50.4	1.329
15	03 56 21.69	2.3692	23 49 57.9	9.054	15	05 59 03.13	2.7024	28 09 04.2	1.132
16	03 58 44.10	2.3778	23 58 57.4	8.929	16	06 01 45.39	2.7060	28 10 06.2	0.933
17	04 01 07.03	2.3865	24 07 49.4	8.803	17	06 04 27.85	2.7093	28 10 56.2	0.733
18	04 03 30.48	2.3952	24 16 33.7	8.674	18	06 07 10.51	2.7125	28 11 34.2	0.534
19	04 05 54.45	2.4038	24 25 10.3	8.544	19	06 09 53.35	2.7154	28 12 00.3	0.334
20	04 08 18.93	2.4124	24 33 39.0	8.411	20	06 12 36.36	2.7183	28 12 14.3	+0.133
21	04 10 43.94	2.4210	24 41 59.6	8.277	21	06 15 19.54	2.7208	28 12 16.2	-0.070
22	04 13 09.45	2.4295	24 50 12.2	8.142	22	06 18 02.86	2.7232	28 12 05.9	0.273
23	04 15 35.48	2.4381	+24 58 16.6	+8.003	23	06 20 46.32	2.7253	+28 11 43.4	-0.478
Friday, January 2.					Sunday, January 4.				
00	04 18 02.02	2.4465	+25 06 12.6	+7.863	00	06 23 29.90	2.7273	+28 11 08.6	-0.681
01	04 20 29.06	2.4550	25 14 00.2	7.723	01	06 26 13.60	2.7291	28 10 21.7	0.883
02	04 22 56.62	2.4634	25 21 39.3	7.579	02	06 28 57.39	2.7306	28 09 22.6	1.088
03	04 25 24.67	2.4717	25 29 09.7	7.433	03	06 31 41.27	2.7319	28 08 11.1	1.293
04	04 27 53.22	2.4800	25 36 31.3	7.287	04	06 34 25.22	2.7330	28 06 47.4	1.498
05	04 30 22.27	2.4883	25 43 44.1	7.138	05	06 37 09.23	2.7339	28 05 11.4	1.703
06	04 32 51.81	2.4963	25 50 47.9	6.988	06	06 39 53.29	2.7347	28 03 23.1	1.908
07	04 35 21.83	2.5044	25 57 42.6	6.835	07	06 42 37.39	2.7352	28 01 22.5	2.113
08	04 37 52.34	2.5124	26 04 28.1	6.681	08	06 45 21.51	2.7354	27 59 09.6	2.318
09	04 40 23.32	2.5203	26 11 04.3	6.525	09	06 48 05.64	2.7355	27 56 44.4	2.523
10	04 42 54.78	2.5283	26 17 31.1	6.367	10	06 50 49.77	2.7353	27 54 06.9	2.728
11	04 45 26.71	2.5361	26 23 48.3	6.208	11	06 53 33.88	2.7350	27 51 17.1	2.933
12	04 47 59.11	2.5438	26 29 56.0	6.048	12	06 56 17.97	2.7345	27 48 14.9	3.138
13	04 50 31.96	2.5513	26 35 54.0	5.884	13	06 59 02.02	2.7337	27 45 00.5	3.343
14	04 53 05.27	2.5588	26 41 42.1	5.719	14	07 01 46.01	2.7327	27 41 33.8	3.547
15	04 55 39.02	2.5663	26 47 20.3	5.553	15	07 04 29.94	2.7316	27 37 54.9	3.751
16	04 58 13.22	2.5736	26 52 48.5	5.385	16	07 07 13.80	2.7303	27 34 03.7	3.955
17	05 00 47.85	2.5807	26 58 06.5	5.216	17	07 09 57.57	2.7286	27 30 00.3	4.158
18	05 03 22.90	2.5878	27 03 14.4	5.045	18	07 12 41.23	2.7268	27 25 44.8	4.360
19	05 05 58.38	2.5947	27 08 11.9	4.872	19	07 15 24.79	2.7250	27 21 17.1	4.562
20	05 08 34.26	2.6014	27 12 59.0	4.698	20	07 18 08.23	2.7228	27 16 37.4	4.763
21	05 11 10.55	2.6082	27 17 35.6	4.523	21	07 20 51.53	2.7204	27 11 45.6	4.963
22	05 13 47.24	2.6148	27 22 01.7	4.345	22	07 23 34.68	2.7179	27 06 41.8	5.163
23	05 16 24.32	2.6212	27 26 17.0	4.166	23	07 26 17.68	2.7153	27 01 26.0	5.363
24	05 19 01.78	2.6274	+27 30 21.6	+3.987	24	07 29 00.51	2.7123	+26 55 58.3	-5.561

MOON, 1931.

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THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Monday, January 5.					Wednesday, January 7.				
00	07 29 00.51	2.7123	+26 55 58.3	-5.561	00	09 33 17.31	2.4335	+19 05 50.9	-13.369
01	07 31 43.16	2.7093	26 50 18.7	5.758	01	09 35 43.11	2.4265	18 52 25.2	13.485
02	07 34 25.62	2.7060	26 44 27.3	5.955	02	09 38 08.49	2.4194	18 38 52.7	13.599
03	07 37 07.88	2.7026	26 38 24.1	6.152	03	09 40 33.44	2.4124	18 25 13.3	13.713
04	07 39 49.93	2.6990	26 32 09.1	6.346	04	09 42 57.98	2.4054	18 11 27.2	13.823
05	07 42 31.76	2.6953	26 25 42.6	6.538	05	09 45 22.09	2.3984	17 57 34.6	13.930
06	07 45 13.36	2.6913	26 19 04.5	6.731	06	09 47 45.79	2.3916	17 43 35.6	14.036
07	07 47 54.72	2.6872	26 12 14.9	6.923	07	09 50 09.08	2.3847	17 29 30.3	14.140
08	07 50 35.82	2.6829	26 05 13.8	7.113	08	09 52 31.95	2.3778	17 15 18.8	14.242
09	07 53 16.67	2.6787	25 58 01.4	7.302	09	09 54 54.41	2.3709	17 01 01.3	14.342
10	07 55 57.26	2.6741	25 50 37.6	7.490	10	09 57 16.46	2.3641	16 46 37.8	14.440
11	07 58 37.56	2.6693	25 43 02.6	7.676	11	09 59 38.10	2.3573	16 32 08.5	14.535
12	08 01 17.58	2.6646	25 35 16.5	7.860	12	10 01 59.34	2.3507	16 17 33.6	14.628
13	08 03 57.31	2.6596	25 27 19.4	8.044	13	10 04 20.18	2.3439	16 02 53.1	14.720
14	08 06 36.73	2.6544	25 19 11.2	8.227	14	10 06 40.61	2.3373	15 48 07.2	14.809
15	08 09 15.84	2.6492	25 10 52.2	8.407	15	10 09 00.65	2.3308	15 33 16.0	14.896
16	08 11 54.64	2.6439	25 02 22.4	8.586	16	10 11 20.30	2.3242	15 18 19.7	14.981
17	08 14 33.11	2.6384	24 53 41.9	8.763	17	10 13 39.55	2.3177	15 03 18.3	15.065
18	08 17 11.25	2.6329	24 44 50.8	8.940	18	10 15 58.42	2.3113	14 48 11.9	15.146
19	08 19 49.06	2.6273	24 35 49.1	9.114	19	10 18 16.90	2.3049	14 33 00.8	15.225
20	08 22 26.52	2.6214	24 26 37.1	9.287	20	10 20 35.01	2.2987	14 17 44.9	15.303
21	08 25 03.63	2.6156	24 17 14.7	9.458	21	10 22 52.74	2.2923	14 02 24.5	15.377
22	08 27 40.39	2.6096	24 07 42.1	9.628	22	10 25 10.09	2.2862	13 46 59.7	15.450
23	08 30 16.78	2.6034	+23 57 59.4	-9.796	23	10 27 27.08	2.2801	+13 31 30.5	-15.522
Tuesday, January 6.					Thursday, January 8.				
00	08 32 52.80	2.5973	+23 48 06.6	-9.962	00	10 29 43.70	2.2740	+13 15 57.1	-15.590
01	08 35 28.45	2.5910	23 38 04.0	10.126	01	10 31 59.96	2.2681	13 00 19.7	15.658
02	08 38 03.72	2.5847	23 27 51.5	10.288	02	10 34 15.87	2.2622	12 44 38.2	15.723
03	08 40 38.61	2.5782	23 17 29.4	10.448	03	10 36 31.42	2.2563	12 28 53.0	15.785
04	08 43 13.10	2.5717	23 06 57.7	10.608	04	10 38 46.62	2.2505	12 13 04.0	15.847
05	08 45 47.21	2.5653	22 56 16.5	10.764	05	10 41 01.48	2.2448	11 57 11.4	15.907
06	08 48 20.93	2.5586	22 45 26.0	10.919	06	10 43 16.00	2.2393	11 41 15.2	15.964
07	08 50 54.24	2.5519	22 34 26.2	11.073	07	10 45 30.19	2.2338	11 25 15.7	16.018
08	08 53 27.16	2.5453	22 23 17.3	11.223	08	10 47 44.05	2.2283	11 09 13.0	16.073
09	08 55 59.67	2.5384	22 11 59.4	11.373	09	10 49 57.58	2.2228	10 53 07.0	16.124
10	08 58 31.77	2.5316	22 00 32.6	11.520	10	10 52 10.79	2.2176	10 36 58.1	16.173
11	09 01 03.46	2.5248	21 48 57.0	11.666	11	10 54 23.69	2.2123	10 20 46.2	16.222
12	09 03 34.74	2.5178	21 37 12.7	11.809	12	10 56 36.27	2.2072	10 04 31.5	16.268
13	09 06 05.60	2.5109	21 25 19.9	11.950	13	10 58 48.55	2.2022	9 48 14.1	16.312
14	09 08 36.05	2.5039	21 13 18.7	12.089	14	11 01 00.53	2.1973	9 31 54.1	16.354
15	09 11 06.07	2.4969	21 01 09.2	12.226	15	11 03 12.22	2.1923	9 15 31.6	16.394
16	09 13 35.68	2.4899	20 48 51.6	12.361	16	11 05 23.61	2.1875	8 59 06.8	16.433
17	09 16 04.86	2.4829	20 36 25.9	12.495	17	11 07 34.72	2.1828	8 42 39.7	16.470
18	09 18 33.63	2.4759	20 23 52.2	12.626	18	11 09 45.55	2.1782	8 26 10.4	16.505
19	09 21 01.97	2.4688	20 11 10.8	12.754	19	11 11 56.10	2.1737	8 09 39.1	16.538
20	09 23 29.88	2.4618	19 58 21.7	12.882	20	11 14 06.39	2.1693	7 53 05.8	16.570
21	09 25 57.38	2.4548	19 45 25.0	13.007	21	11 16 16.41	2.1648	7 36 30.7	16.600
22	09 28 24.45	2.4476	19 32 20.9	13.129	22	11 18 26.17	2.1606	7 19 53.8	16.628
23	09 30 51.09	2.4405	19 19 09.5	13.250	23	11 20 35.68	2.1564	7 03 15.3	16.654
24	09 33 17.31	2.4335	+19 05 50.9	-13.369	24	11 22 44.94	2.1523	+6 46 35.3	-16.678

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Friday, January 9.					Sunday, January 11.				
00	11 22 44.94	2.1523	+ 6 46 35.3	-16.678	00	13 03 08.48	2.0664	- 6 32 31.6	-16.064
01	11 24 53.96	2.1483	6 29 53.9	16.702	01	13 05 12.48	2.0668	6 48 34.1	16.018
02	11 27 02.74	2.1444	6 13 11.1	16.723	02	13 07 16.50	2.0673	7 04 33.7	15.969
03	11 29 11.29	2.1407	5 56 27.2	16.742	03	13 09 20.56	2.0680	7 20 30.4	15.921
04	11 31 19.62	2.1370	5 39 42.1	16.760	04	13 11 24.66	2.0687	7 36 24.2	15.871
05	11 33 27.73	2.1333	5 22 56.0	16.777	05	13 13 28.80	2.0694	7 52 14.9	15.819
06	11 35 35.62	2.1298	5 06 08.9	16.792	06	13 15 32.99	2.0703	8 08 02.5	15.767
07	11 37 43.31	2.1264	4 49 21.0	16.804	07	13 17 37.23	2.0713	8 23 46.9	15.713
08	11 39 50.79	2.1230	4 32 32.4	16.815	08	13 19 41.54	2.0723	8 39 28.0	15.658
09	11 41 58.07	2.1198	4 15 43.2	16.825	09	13 21 45.90	2.0733	8 55 05.8	15.602
10	11 44 05.16	2.1167	3 58 53.4	16.833	10	13 23 50.34	2.0746	9 10 40.2	15.544
11	11 46 12.07	2.1136	3 42 03.2	16.839	11	13 25 54.85	2.0758	9 26 11.1	15.486
12	11 48 18.79	2.1106	3 25 12.7	16.844	12	13 27 59.44	2.0772	9 41 38.5	15.426
13	11 50 25.34	2.1078	3 08 21.9	16.848	13	13 30 04.11	2.0785	9 57 02.2	15.365
14	11 52 31.73	2.1051	2 51 30.9	16.850	14	13 32 08.86	2.0799	10 12 22.3	15.303
15	11 54 37.95	2.1024	2 34 39.9	16.850	15	13 34 13.70	2.0815	10 27 38.5	15.238
16	11 56 44.02	2.0998	2 17 48.9	16.849	16	13 36 18.64	2.0832	10 42 50.9	15.174
17	11 58 49.92	2.0973	2 00 58.0	16.847	17	13 38 23.68	2.0848	10 57 59.4	15.109
18	12 00 55.69	2.0949	1 44 07.3	16.843	18	13 40 28.82	2.0866	11 13 04.0	15.042
19	12 03 01.31	2.0926	1 27 16.9	16.837	19	13 42 34.07	2.0884	11 28 04.4	14.973
20	12 05 06.80	2.0903	1 10 26.9	16.829	20	13 44 39.43	2.0903	11 43 00.8	14.905
21	12 07 12.15	2.0883	0 53 37.4	16.821	21	13 46 44.91	2.0923	11 57 53.0	14.834
22	12 09 17.39	2.0863	0 36 48.4	16.811	22	13 48 50.51	2.0944	12 12 40.9	14.763
23	12 11 22.50	2.0843	+ 0 20 00.1	-16.799	23	13 50 56.24	2.0966	-12 27 24.5	-14.690
Saturday, January 10.					Monday, January 12.				
00	12 13 27.50	2.0825	+ 0 03 12.5	-16.786	00	13 53 02.10	2.0988	-12 42 03.7	-14.616
01	12 15 32.40	2.0808	- 0 13 34.2	16.772	01	13 55 08.09	2.1010	12 56 38.4	14.541
02	12 17 37.20	2.0793	0 30 20.1	16.756	02	13 57 14.22	2.1033	13 11 08.6	14.465
03	12 19 41.91	2.0778	0 47 04.9	16.738	03	13 59 20.48	2.1057	13 25 34.2	14.388
04	12 21 46.53	2.0763	1 03 48.7	16.720	04	14 01 26.90	2.1082	13 39 55.1	14.308
05	12 23 51.06	2.0748	1 20 31.3	16.700	05	14 03 33.46	2.1106	13 54 11.2	14.229
06	12 25 55.51	2.0736	1 37 12.7	16.678	06	14 05 40.17	2.1132	14 08 22.6	14.149
07	12 27 59.89	2.0724	1 53 52.7	16.655	07	14 07 47.04	2.1158	14 22 29.1	14.067
08	12 30 04.20	2.0713	2 10 31.3	16.631	08	14 09 54.07	2.1185	14 36 30.6	13.983
09	12 32 08.44	2.0703	2 27 08.4	16.606	09	14 12 01.26	2.1212	14 50 27.1	13.900
10	12 34 12.63	2.0694	2 43 44.0	16.579	10	14 14 08.61	2.1239	15 04 18.6	13.814
11	12 36 16.77	2.0687	3 00 17.9	16.550	11	14 16 16.13	2.1268	15 18 04.8	13.728
12	12 38 20.87	2.0680	3 16 50.0	16.520	12	14 18 23.83	2.1298	15 31 45.9	13.640
13	12 40 24.93	2.0673	3 33 20.3	16.490	13	14 20 31.70	2.1327	15 45 21.6	13.551
14	12 42 28.95	2.0668	3 49 48.8	16.458	14	14 22 39.75	2.1358	15 58 52.0	13.462
15	12 44 32.95	2.0664	4 06 15.2	16.423	15	14 24 47.99	2.1388	16 12 17.0	13.371
16	12 46 36.92	2.0660	4 22 39.6	16.389	16	14 26 56.40	2.1418	16 25 36.5	13.279
17	12 48 40.87	2.0658	4 39 01.9	16.353	17	14 29 05.00	2.1450	16 38 50.5	13.186
18	12 50 44.81	2.0657	4 55 22.0	16.316	18	14 31 13.80	2.1482	16 51 58.8	13.092
19	12 52 48.75	2.0656	5 11 39.8	16.277	19	14 33 22.78	2.1513	17 05 01.5	12.996
20	12 54 52.68	2.0655	5 27 55.2	16.237	20	14 35 31.96	2.1546	17 17 58.3	12.899
21	12 56 56.61	2.0656	5 44 08.2	16.195	21	14 37 41.33	2.1579	17 30 49.4	12.803
22	12 59 00.55	2.0658	6 00 18.6	16.152	22	14 39 50.91	2.1613	17 43 34.6	12.704
23	13 01 04.51	2.0661	6 16 26.4	16.108	23	14 42 00.68	2.1646	17 56 13.9	12.604
24	13 03 08.48	2.0664	- 6 32 31.6	-16.064	24	14 44 10.66	2.1681	-18 08 47.1	-12.503

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Tuesday, January 13.					Thursday, January 15.				
00	^h 14 ^m 44 ^s 10.66	2.1681	[°] 18 ['] 08 ["] 47.1	-12.503	00	^h 16 ^m 32 ^s 22.88	2.3349	[°] 25 ['] 53 ["] 35.9	-6.511
01	14 46 20.85	2.1715	18 21 14.3	12.401	01	16 34 43.06	2.3376	26 00 02.2	6.365
02	14 48 31.24	2.1749	18 33 35.3	12.298	02	16 37 03.39	2.3402	26 06 19.7	6.219
03	14 50 41.84	2.1785	18 45 50.1	12.194	03	16 39 23.88	2.3428	26 12 28.5	6.073
04	14 52 52.66	2.1820	18 57 58.6	12.089	04	16 41 44.52	2.3453	26 18 28.5	5.926
05	14 55 03.68	2.1855	19 10 00.8	11.984	05	16 44 05.31	2.3476	26 24 19.6	5.778
06	14 57 14.92	2.1892	19 21 56.7	11.877	06	16 46 26.23	2.3499	26 30 01.8	5.630
07	14 59 26.38	2.1928	19 33 46.0	11.768	07	16 48 47.30	2.3522	26 35 35.2	5.482
08	15 01 38.05	2.1963	19 45 28.8	11.659	08	16 51 08.49	2.3543	26 40 59.6	5.333
09	15 03 49.94	2.2000	19 57 05.1	11.549	09	16 53 29.81	2.3564	26 46 15.1	5.183
10	15 06 02.05	2.2037	20 08 34.7	11.437	10	16 55 51.26	2.3584	26 51 21.5	5.032
11	15 08 14.38	2.2073	20 19 57.5	11.324	11	16 58 12.82	2.3603	26 56 18.9	4.882
12	15 10 26.93	2.2110	20 31 13.6	11.212	12	17 00 34.50	2.3622	27 01 07.3	4.731
13	15 12 39.70	2.2148	20 42 22.9	11.097	13	17 02 56.28	2.3639	27 05 46.6	4.579
14	15 14 52.70	2.2184	20 53 25.2	10.981	14	17 05 18.17	2.3656	27 10 16.8	4.428
15	15 17 05.91	2.2222	21 04 20.6	10.865	15	17 07 40.15	2.3672	27 14 37.9	4.275
16	15 19 19.36	2.2259	21 15 09.0	10.748	16	17 10 02.23	2.3686	27 18 49.8	4.122
17	15 21 33.02	2.2296	21 25 50.3	10.629	17	17 12 24.38	2.3699	27 22 52.5	3.969
18	15 23 46.91	2.2333	21 36 24.5	10.510	18	17 14 46.62	2.3712	27 26 46.1	3.817
19	15 26 01.02	2.2370	21 46 51.5	10.389	19	17 17 08.93	2.3723	27 30 30.5	3.663
20	15 28 15.35	2.2408	21 57 11.2	10.268	20	17 19 31.30	2.3734	27 34 05.6	3.509
21	15 30 29.91	2.2445	22 07 23.6	10.146	21	17 21 53.74	2.3744	27 37 31.6	3.356
22	15 32 44.69	2.2482	22 17 28.7	10.023	22	17 24 16.23	2.3753	27 40 48.3	3.201
23	15 34 59.69	2.2519	22 27 26.3	9.898	23	17 26 38.77	2.3761	27 43 55.7	3.046
Wednesday, January 14.					Friday, January 16.				
00	15 37 14.92	2.2556	22 37 16.4	9.773	00	17 29 01.36	2.3768	27 46 53.8	2.892
01	15 39 30.36	2.2593	22 46 59.0	9.647	01	17 31 23.98	2.3773	27 49 42.7	2.738
02	15 41 46.03	2.2630	22 56 34.0	9.519	02	17 33 46.64	2.3778	27 52 22.3	2.582
03	15 44 01.92	2.2666	23 06 01.3	9.391	03	17 36 09.32	2.3781	27 54 52.5	2.427
04	15 46 18.02	2.2702	23 15 20.9	9.263	04	17 38 32.01	2.3783	27 57 13.5	2.272
05	15 48 34.34	2.2738	23 24 32.8	9.133	05	17 40 54.72	2.3785	27 59 25.1	2.117
06	15 50 50.88	2.2774	23 33 36.8	9.002	06	17 43 17.43	2.3785	28 01 27.5	1.962
07	15 53 07.63	2.2809	23 42 33.0	8.870	07	17 45 40.14	2.3784	28 03 20.5	1.807
08	15 55 24.59	2.2844	23 51 21.2	8.738	08	17 48 02.84	2.3783	28 05 04.3	1.652
09	15 57 41.76	2.2879	24 00 01.5	8.605	09	17 50 25.53	2.3780	28 06 38.7	1.497
10	15 59 59.14	2.2913	24 08 33.8	8.470	10	17 52 48.20	2.3776	28 08 03.9	1.342
11	16 02 16.72	2.2948	24 16 57.9	8.335	11	17 55 10.84	2.3771	28 09 19.7	1.186
12	16 04 34.51	2.2982	24 25 14.0	8.200	12	17 57 33.45	2.3765	28 10 26.2	1.031
13	16 06 52.50	2.3015	24 33 21.9	8.063	13	17 59 56.02	2.3758	28 11 23.4	0.876
14	16 09 10.69	2.3048	24 41 21.5	7.925	14	18 02 18.54	2.3749	28 12 11.3	0.722
15	16 11 29.08	2.3081	24 49 12.9	7.788	15	18 04 41.01	2.3739	28 12 50.0	0.568
16	16 13 47.66	2.3113	24 56 56.0	7.648	16	18 07 03.41	2.3728	28 13 19.4	0.413
17	16 16 06.43	2.3143	25 04 30.7	7.508	17	18 09 25.75	2.3718	28 13 39.5	0.258
18	16 18 25.38	2.3174	25 11 57.0	7.368	18	18 11 48.02	2.3705	28 13 50.4	0.105
19	16 20 44.52	2.3206	25 19 14.9	7.227	19	18 14 10.21	2.3691	28 13 52.1	+0.048
20	16 23 03.85	2.3236	25 26 24.2	7.085	20	18 16 32.31	2.3675	28 13 44.6	0.202
21	16 25 23.35	2.3264	25 33 25.1	6.943	21	18 18 54.31	2.3659	28 13 27.9	0.355
22	16 27 43.02	2.3293	25 40 17.3	6.798	22	18 21 16.22	2.3642	28 13 02.0	0.508
23	16 30 02.87	2.3322	25 47 00.9	6.655	23	18 23 38.01	2.3623	28 12 26.9	0.662
24	16 32 22.88	2.3349	25 53 35.9	6.511	24	18 25 59.70	2.3604	28 11 42.6	+0.813

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Saturday, January 17.					Monday, January 19.				
00	^h 18 ^m 25 ^s 59.70	2.3604	[°] 28 ['] 11 ["] 42.6	+ 0.813	00	^h 20 ^m 15 ^s 19.40	2.1674	[°] 24 ['] 49 ["] 10.7	+ 7.318
01	18 28 21.26	2.3583	28 10 49.3	0.964	01	20 17 29.28	2.1620	24 41 48.2	7.431
02	18 30 42.70	2.3563	28 09 46.9	1.116	02	20 19 38.84	2.1567	24 34 19.0	7.543
03	18 33 04.01	2.3540	28 08 35.4	1.267	03	20 21 48.08	2.1513	24 26 43.1	7.654
04	18 35 25.18	2.3516	28 07 14.9	1.417	04	20 23 56.99	2.1458	24 19 00.5	7.764
05	18 37 46.20	2.3492	28 05 45.4	1.566	05	20 26 05.57	2.1403	24 11 11.4	7.873
06	18 40 07.08	2.3467	28 04 07.0	1.715	06	20 28 13.82	2.1348	24 03 15.7	7.982
07	18 42 27.80	2.3439	28 02 19.6	1.865	07	20 30 21.75	2.1294	23 55 13.6	8.088
08	18 44 48.35	2.3412	28 00 23.2	2.013	08	20 32 29.35	2.1238	23 47 05.1	8.194
09	18 47 08.74	2.3383	27 58 18.0	2.160	09	20 34 36.61	2.1183	23 38 50.3	8.299
10	18 49 28.95	2.3353	27 56 04.0	2.308	10	20 36 43.55	2.1128	23 30 29.2	8.403
11	18 51 48.98	2.3323	27 53 41.1	2.454	11	20 38 50.15	2.1073	23 22 01.9	8.506
12	18 54 08.83	2.3292	27 51 09.5	2.600	12	20 40 56.42	2.1018	23 13 28.5	8.608
13	18 56 28.49	2.3259	27 48 29.1	2.746	13	20 43 02.36	2.0963	23 04 49.0	8.708
14	18 58 47.94	2.3226	27 45 40.0	2.890	14	20 45 07.97	2.0908	22 56 03.5	8.808
15	19 01 07.20	2.3192	27 42 42.3	3.034	15	20 47 13.25	2.0852	22 47 12.1	8.906
16	19 03 26.24	2.3157	27 39 35.9	3.178	16	20 49 18.19	2.0797	22 38 14.8	9.003
17	19 05 45.08	2.3121	27 36 21.0	3.320	17	20 51 22.81	2.0742	22 29 11.7	9.100
18	19 08 03.69	2.3083	27 32 57.5	3.463	18	20 53 27.09	2.0686	22 20 02.8	9.195
19	19 10 22.08	2.3047	27 29 25.5	3.603	19	20 55 31.04	2.0632	22 10 48.3	9.288
20	19 12 40.25	2.3008	27 25 45.1	3.743	20	20 57 34.67	2.0577	22 01 28.2	9.382
21	19 14 58.18	2.2969	27 21 56.3	3.883	21	20 59 37.96	2.0522	21 52 02.5	9.474
22	19 17 15.88	2.2929	27 17 59.1	4.022	22	21 01 40.93	2.0468	21 42 31.3	9.565
23	19 19 33.33	2.2888	27 13 53.7	+ 4.160	23	21 03 43.57	2.0413	21 32 54.7	+ 9.655
Sunday, January 18.					Tuesday, January 20.				
00	19 21 50.53	2.2846	27 09 39.9	+ 4.298	00	21 05 45.88	2.0358	21 23 12.7	+ 9.744
01	19 24 07.48	2.2804	27 05 17.9	4.434	01	21 07 47.87	2.0304	21 13 25.4	9.832
02	19 26 24.18	2.2761	27 00 47.8	4.569	02	21 09 49.53	2.0250	21 03 32.9	9.918
03	19 28 40.61	2.2717	26 56 09.6	4.704	03	21 11 50.87	2.0197	20 53 35.3	10.003
04	19 30 56.78	2.2673	26 51 23.3	4.838	04	21 13 51.89	2.0143	20 43 32.5	10.088
05	19 33 12.68	2.2628	26 46 29.0	4.972	05	21 15 52.59	2.0090	20 33 24.7	10.172
06	19 35 28.31	2.2583	26 41 26.7	5.103	06	21 17 52.97	2.0037	20 23 11.9	10.255
07	19 37 43.67	2.2536	26 36 16.6	5.234	07	21 19 53.03	1.9984	20 12 54.1	10.337
08	19 39 58.74	2.2488	26 30 58.6	5.365	08	21 21 52.78	1.9932	20 02 31.5	10.416
09	19 42 13.53	2.2442	26 25 32.8	5.494	09	21 23 52.21	1.9879	19 52 04.2	10.496
10	19 44 28.04	2.2393	26 19 59.3	5.623	10	21 25 51.33	1.9828	19 41 32.0	10.574
11	19 46 42.25	2.2344	26 14 18.1	5.750	11	21 27 50.14	1.9776	19 30 55.3	10.651
12	19 48 56.17	2.2295	26 08 29.3	5.877	12	21 29 48.64	1.9725	19 20 13.9	10.728
13	19 51 09.79	2.2246	26 02 32.9	6.002	13	21 31 46.84	1.9674	19 09 28.0	10.803
14	19 53 23.12	2.2196	25 56 29.1	6.127	14	21 33 44.73	1.9623	18 58 37.6	10.878
15	19 55 36.14	2.2145	25 50 17.7	6.251	15	21 35 42.32	1.9573	18 47 42.7	10.951
16	19 57 48.86	2.2094	25 43 59.0	6.373	16	21 37 39.60	1.9523	18 36 43.5	11.023
17	20 00 01.27	2.2043	25 37 33.0	6.494	17	21 39 36.60	1.9474	18 25 40.0	11.093
18	20 02 13.38	2.1992	25 30 59.7	6.615	18	21 41 33.29	1.9425	18 14 32.3	11.164
19	20 04 25.17	2.1939	25 24 19.2	6.735	19	21 43 29.70	1.9377	18 03 20.3	11.234
20	20 06 36.65	2.1888	25 17 31.5	6.853	20	21 45 25.81	1.9328	17 52 04.2	11.302
21	20 08 47.82	2.1835	25 10 36.8	6.971	21	21 47 21.64	1.9281	17 40 44.1	11.368
22	20 10 58.67	2.1781	25 03 35.0	7.088	22	21 49 17.18	1.9233	17 29 20.0	11.435
23	20 13 09.19	2.1728	24 56 26.3	7.203	23	21 51 12.44	1.9186	17 17 51.9	11.501
24	20 15 19.40	2.1674	24 49 10.7	+ 7.318	24	21 53 07.41	1.9139	17 06 19.9	+ 11.565

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Wednesday, January 21.					Friday, January 23.				
00	^h 21 ^m 53 ^s 07.41	1.9139	—17° 06' 19.9"	+11.565	00	^h 23 ^m 20 ^s 40.80	1.7577	— 6° 53' 58.4"	+13.634
01	21 55 02.11	1.9094	16 54 44.1	11.628	01	23 22 26.21	1.7561	6 40 19.6	13.658
02	21 56 56.54	1.9048	16 43 04.5	11.691	02	23 24 11.53	1.7545	6 26 39.4	13.681
03	21 58 50.69	1.9003	16 31 21.2	11.753	03	23 25 56.75	1.7529	6 12 57.9	13.703
04	22 00 44.57	1.8958	16 19 34.2	11.813	04	23 27 41.88	1.7514	5 59 15.0	13.726
05	22 02 38.19	1.8915	16 07 43.6	11.873	05	23 29 26.92	1.7501	5 45 30.8	13.747
06	22 04 31.55	1.8872	15 55 49.5	11.932	06	23 31 11.89	1.7488	5 31 45.4	13.767
07	22 06 24.65	1.8828	15 43 51.8	11.989	07	23 32 56.77	1.7475	5 17 58.8	13.787
08	22 08 17.49	1.8785	15 31 50.8	12.046	08	23 34 41.59	1.7463	5 04 11.0	13.807
09	22 10 10.07	1.8743	15 19 46.3	12.103	09	23 36 26.33	1.7453	4 50 22.0	13.825
10	22 12 02.41	1.8703	15 07 38.5	12.157	10	23 38 11.02	1.7443	4 36 32.0	13.842
11	22 13 54.50	1.8662	14 55 27.5	12.211	11	23 39 55.64	1.7433	4 22 41.0	13.859
12	22 15 46.35	1.8622	14 43 13.2	12.265	12	23 41 40.21	1.7424	4 08 48.9	13.876
13	22 17 37.96	1.8582	14 30 55.7	12.317	13	23 43 24.73	1.7416	3 54 55.9	13.892
14	22 19 29.33	1.8542	14 18 35.2	12.368	14	23 45 09.20	1.7408	3 41 01.9	13.907
15	22 21 20.46	1.8503	14 06 11.6	12.419	15	23 46 53.62	1.7402	3 27 07.1	13.921
16	22 23 11.37	1.8466	13 53 44.9	12.469	16	23 48 38.02	1.7396	3 13 11.4	13.935
17	22 25 02.05	1.8428	13 41 15.3	12.518	17	23 50 22.37	1.7390	2 59 14.9	13.948
18	22 26 52.50	1.8391	13 28 42.8	12.566	18	23 52 06.70	1.7387	2 45 17.7	13.960
19	22 28 42.74	1.8355	13 16 07.4	12.613	19	23 53 51.01	1.7383	2 31 19.7	13.972
20	22 30 32.76	1.8318	13 03 29.2	12.659	20	23 55 35.29	1.7379	2 17 21.1	13.983
21	22 32 22.56	1.8283	12 50 48.3	12.704	21	23 57 19.56	1.7378	2 03 21.8	13.993
22	22 34 12.16	1.8249	12 38 04.7	12.749	22	23 59 03.82	1.7376	1 49 21.9	14.003
23	22 36 01.55	1.8215	—12° 25' 18.4"	+12.793	23	00 00 48.07	1.7375	— 1 35 21.5	+14.012
Thursday, January 22.					Saturday, January 24.				
00	22 37 50.74	1.8182	—12° 12' 29.5"	+12.837	00	00 02 32.32	1.7375	— 1 21 20.5	+14.020
01	22 39 39.73	1.8149	11 59 38.0	12.878	01	00 04 16.57	1.7377	1 07 19.1	14.028
02	22 41 28.53	1.8118	11 46 44.1	12.919	02	00 06 00.84	1.7378	0 53 17.2	14.035
03	22 43 17.14	1.8087	11 33 47.7	12.960	03	00 07 45.11	1.7380	0 39 14.9	14.042
04	22 45 05.57	1.8056	11 20 48.9	13.000	04	00 09 29.40	1.7383	0 25 12.2	14.048
05	22 46 53.81	1.8025	11 07 47.7	13.039	05	00 11 13.71	1.7387	— 0 11 09.2	14.052
06	22 48 41.87	1.7995	10 54 44.2	13.077	06	00 12 58.04	1.7392	+ 0 02 54.0	14.056
07	22 50 29.75	1.7967	10 41 38.5	13.114	07	00 14 42.41	1.7398	0 16 57.5	14.061
08	22 52 17.47	1.7938	10 28 30.5	13.152	08	00 16 26.81	1.7403	0 31 01.3	14.063
09	22 54 05.01	1.7910	10 15 20.3	13.187	09	00 18 11.25	1.7410	0 45 05.1	14.065
10	22 55 52.39	1.7884	10 02 08.1	13.222	10	00 19 55.73	1.7418	0 59 09.1	14.068
11	22 57 39.62	1.7858	9 48 53.7	13.257	11	00 21 40.26	1.7427	1 13 13.2	14.068
12	22 59 26.68	1.7832	9 35 37.3	13.290	12	00 23 24.85	1.7436	1 27 17.3	14.069
13	23 01 13.60	1.7807	9 22 18.9	13.323	13	00 25 09.49	1.7446	1 41 21.5	14.069
14	23 03 00.36	1.7783	9 08 58.6	13.354	14	00 26 54.20	1.7457	1 55 25.6	14.068
15	23 04 46.99	1.7759	8 55 36.4	13.385	15	00 28 38.97	1.7468	2 09 29.6	14.066
16	23 06 33.47	1.7736	8 42 12.4	13.416	16	00 30 23.82	1.7481	2 23 33.5	14.064
17	23 08 19.82	1.7713	8 28 46.5	13.447	17	00 32 08.74	1.7494	2 37 37.3	14.061
18	23 10 06.03	1.7692	8 15 18.8	13.475	18	00 33 53.75	1.7508	2 51 40.8	14.057
19	23 11 52.12	1.7672	8 01 49.5	13.503	19	00 35 38.84	1.7523	3 05 44.1	14.053
20	23 13 38.09	1.7652	7 48 18.5	13.531	20	00 37 24.02	1.7538	3 19 47.2	14.048
21	23 15 23.94	1.7632	7 34 45.8	13.558	21	00 39 09.30	1.7553	3 33 49.9	14.042
22	23 17 09.67	1.7613	7 21 11.5	13.584	22	00 40 54.68	1.7573	3 47 52.2	14.036
23	23 18 55.29	1.7594	7 07 35.7	13.609	23	00 42 40.17	1.7590	4 01 54.2	14.029
24	23 20 40.80	1.7577	— 6° 53' 58.4"	+13.634	24	00 44 25.76	1.7608	+ 4 15 55.7	+14.021

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Sunday, January 25.					Tuesday, January 27.				
00	h m s	s	° ' "	"	00	h m s	s	° ' "	"
00	00 44 25.76	1.7608	+ 4 15 55.7	+14.021	00	02 12 40.40	1.9478	+15 05 29.6	+12.717
01	00 46 11.47	1.7628	4 29 56.7	14.013	01	02 14 37.45	1.9538	15 18 11.1	12.667
02	00 47 57.30	1.7648	4 43 57.2	14.004	02	02 16 34.85	1.9598	15 30 49.6	12.616
03	00 49 43.25	1.7670	4 57 57.2	13.994	03	02 18 32.62	1.9659	15 43 25.0	12.563
04	00 51 29.34	1.7693	5 11 56.5	13.983	04	02 20 30.76	1.9721	15 55 57.2	12.509
05	00 53 15.56	1.7715	5 25 55.1	13.972	05	02 22 29.27	1.9783	16 08 26.1	12.455
06	00 55 01.92	1.7738	5 39 53.1	13.960	06	02 24 28.15	1.9846	16 20 51.8	12.400
07	00 56 48.42	1.7763	5 53 50.3	13.947	07	02 26 27.42	1.9910	16 33 14.1	12.343
08	00 58 35.07	1.7788	6 07 46.7	13.933	08	02 28 27.07	1.9974	16 45 32.9	12.285
09	01 00 21.88	1.7814	6 21 42.3	13.919	09	02 30 27.11	2.0040	16 57 48.3	12.226
10	01 02 08.84	1.7841	6 35 37.0	13.905	10	02 32 27.55	2.0107	17 10 00.0	12.165
11	01 03 55.97	1.7869	6 49 30.9	13.889	11	02 34 28.39	2.0173	17 22 08.1	12.104
12	01 05 43.27	1.7898	7 03 23.7	13.872	12	02 36 29.63	2.0241	17 34 12.5	12.041
13	01 07 30.74	1.7927	7 17 15.5	13.855	13	02 38 31.28	2.0309	17 46 13.0	11.977
14	01 09 18.39	1.7957	7 31 06.3	13.837	14	02 40 33.34	2.0378	17 58 09.7	11.912
15	01 11 06.22	1.7988	7 44 55.9	13.818	15	02 42 35.82	2.0448	18 10 02.4	11.845
16	01 12 54.24	1.8020	7 58 44.5	13.799	16	02 44 38.72	2.0519	18 21 51.1	11.778
17	01 14 42.46	1.8053	8 12 31.8	13.778	17	02 46 42.05	2.0590	18 33 35.7	11.708
18	01 16 30.87	1.8086	8 26 17.9	13.758	18	02 48 45.80	2.0662	18 45 16.1	11.638
19	01 18 19.49	1.8121	8 40 02.7	13.736	19	02 50 49.99	2.0735	18 56 52.3	11.566
20	01 20 08.32	1.8155	8 53 46.2	13.713	20	02 52 54.62	2.0808	19 08 24.0	11.493
21	01 21 57.35	1.8191	9 07 28.2	13.689	21	02 54 59.69	2.0883	19 19 51.4	11.418
22	01 23 46.61	1.8228	9 21 08.9	13.665	22	02 57 05.21	2.0957	19 31 14.2	11.342
23	01 25 36.09	1.8266	+ 9 34 48.0	+13.639	23	02 59 11.17	2.1032	+19 42 32.4	+11.265
Monday, January 26.					Wednesday, January 28.				
00	01 27 25.80	1.8304	+ 9 48 25.6	+13.613	00	03 01 17.59	2.1108	+19 53 46.0	+11.187
01	01 29 15.74	1.8343	10 02 01.6	13.587	01	03 03 24.46	2.1184	20 04 54.8	11.106
02	01 31 05.92	1.8384	10 15 36.0	13.559	02	03 05 31.80	2.1262	20 15 58.7	11.025
03	01 32 56.35	1.8425	10 29 08.7	13.531	03	03 07 39.60	2.1339	20 26 57.8	10.943
04	01 34 47.02	1.8467	10 42 39.7	13.502	04	03 09 47.87	2.1418	20 37 51.8	10.858
05	01 36 37.95	1.8510	10 56 08.9	13.472	05	03 11 56.62	2.1497	20 48 40.7	10.771
06	01 38 29.14	1.8553	11 09 36.3	13.440	06	03 14 05.83	2.1576	20 59 24.3	10.684
07	01 40 20.59	1.8598	11 23 01.7	13.408	07	03 16 15.53	2.1656	21 10 02.8	10.596
08	01 42 12.31	1.8643	11 36 25.2	13.375	08	03 18 25.70	2.1736	21 20 35.8	10.504
09	01 44 04.30	1.8688	11 49 46.7	13.341	09	03 20 36.36	2.1817	21 31 03.3	10.412
10	01 45 56.57	1.8735	12 03 06.1	13.306	10	03 22 47.50	2.1898	21 41 25.3	10.320
11	01 47 49.12	1.8783	12 16 23.4	13.270	11	03 24 59.13	2.1979	21 51 41.7	10.225
12	01 49 41.96	1.8832	12 29 38.5	13.233	12	03 27 11.25	2.2061	22 01 52.3	10.128
13	01 51 35.10	1.8881	12 42 51.4	13.197	13	03 29 23.86	2.2143	22 11 57.1	10.030
14	01 53 28.53	1.8931	12 56 02.1	13.158	14	03 31 36.97	2.2227	22 21 55.9	9.930
15	01 55 22.27	1.8983	13 09 10.4	13.118	15	03 33 50.58	2.2310	22 31 48.7	9.829
16	01 57 16.32	1.9034	13 22 16.3	13.078	16	03 36 04.69	2.2393	22 41 35.4	9.727
17	01 59 10.68	1.9087	13 35 19.7	13.036	17	03 38 19.30	2.2478	22 51 15.9	9.623
18	02 01 05.36	1.9140	13 48 20.6	12.993	18	03 40 34.42	2.2562	23 00 50.1	9.516
19	02 03 00.36	1.9194	14 01 18.9	12.950	19	03 42 50.04	2.2645	23 10 17.8	9.408
20	02 04 55.69	1.9249	14 14 14.6	12.906	20	03 45 06.16	2.2730	23 19 39.0	9.298
21	02 06 51.35	1.9306	14 27 07.6	12.860	21	03 47 22.80	2.2815	23 28 53.6	9.188
22	02 08 47.36	1.9363	14 39 57.8	12.813	22	03 49 39.94	2.2899	23 38 01.5	9.075
23	02 10 43.71	1.9420	14 52 45.1	12.765	23	03 51 57.59	2.2985	23 47 02.6	8.961
24	02 12 40.40	1.9478	+15 05 29.6	+12.717	24	03 54 15.76	2.3071	+23 55 56.8	+8.845

MOON, 1931.

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THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Thursday, January 29.					Saturday, January 31.				
00	^h 03 ^m 54 ^s 15.76	2.3071	+23 55 56.8	+8.845	00	^h 05 ^m 54 ^s 14.64	2.6628	+28 14 44.4	+1.323
01	03 56 34.44	2.3155	24 04 44.0	8.728	01	05 56 54.55	2.6675	28 15 58.1	1.131
02	03 58 53.62	2.3241	24 13 24.1	8.608	02	05 59 34.74	2.6720	28 17 00.1	0.937
03	04 01 13.33	2.3327	24 21 57.0	8.487	03	06 02 15.19	2.6764	28 17 50.5	0.742
04	04 03 33.54	2.3412	24 30 22.5	8.364	04	06 04 55.91	2.6807	28 18 29.1	0.547
05	04 05 54.27	2.3498	24 38 40.7	8.240	05	06 07 36.87	2.6847	28 18 56.1	0.351
06	04 08 15.51	2.3583	24 46 51.3	8.113	06	06 10 18.07	2.6886	28 19 11.2	+0.153
07	04 10 37.27	2.3668	24 54 54.2	7.985	07	06 12 59.50	2.6923	28 19 14.4	-0.045
08	04 12 59.53	2.3753	25 02 49.5	7.856	08	06 15 41.15	2.6958	28 19 05.8	0.243
09	04 15 22.30	2.3838	25 10 36.9	7.724	09	06 18 23.00	2.6991	28 18 45.2	0.443
10	04 17 45.59	2.3923	25 18 16.4	7.592	10	06 21 05.04	2.7023	28 18 12.6	0.643
11	04 20 09.38	2.4008	25 25 47.9	7.457	11	06 23 47.27	2.7053	28 17 28.0	0.845
12	04 22 33.68	2.4092	25 33 11.2	7.320	12	06 26 29.67	2.7080	28 16 31.2	1.048
13	04 24 58.48	2.4176	25 40 26.3	7.182	13	06 29 12.23	2.7106	28 15 22.3	1.249
14	04 27 23.79	2.4260	25 47 33.0	7.042	14	06 31 54.94	2.7129	28 14 01.3	1.452
15	04 29 49.60	2.4343	25 54 31.3	6.900	15	06 34 37.78	2.7151	28 12 28.1	1.656
16	04 32 15.91	2.4426	26 01 21.0	6.757	16	06 37 20.75	2.7172	28 10 42.6	1.859
17	04 34 42.71	2.4508	26 08 02.1	6.612	17	06 40 03.84	2.7189	28 08 45.0	2.063
18	04 37 10.01	2.4590	26 14 34.4	6.464	18	06 42 47.02	2.7204	28 06 35.1	2.268
19	04 39 37.79	2.4672	26 20 57.8	6.316	19	06 45 30.29	2.7219	28 04 12.9	2.472
20	04 42 06.07	2.4753	26 27 12.3	6.166	20	06 48 13.65	2.7232	28 01 38.5	2.676
21	04 44 34.82	2.4833	26 33 17.7	6.013	21	06 50 57.07	2.7241	27 58 51.8	2.882
22	04 47 04.06	2.4913	26 39 13.9	5.859	22	06 53 40.54	2.7249	27 55 52.7	3.088
23	04 49 33.77	2.4991	+26 45 00.8	+5.704	23	06 56 24.06	2.7256	+27 52 41.3	-3.293
Friday, January 30.					Sunday, February 1.				
00	04 52 03.95	2.5069	+26 50 38.4	+5.548	00	06 59 07.61	2.7260	+27 49 17.6	-3.498
01	04 54 34.60	2.5148	26 56 06.6	5.389	01	07 01 51.18	2.7262	27 45 41.6	3.703
02	04 57 05.72	2.5224	27 01 25.1	5.228	02	07 04 34.75	2.7262	27 41 53.3	3.908
03	04 59 37.29	2.5299	27 06 34.0	5.067	03	07 07 18.32	2.7260	27 37 52.6	4.114
04	05 02 09.31	2.5375	27 11 33.1	4.903	04	07 10 01.87	2.7257	27 33 39.6	4.318
05	05 04 41.79	2.5449	27 16 22.4	4.738	05	07 12 45.40	2.7251	27 29 14.4	4.523
06	05 07 14.70	2.5521	27 21 01.7	4.571	06	07 15 28.88	2.7243	27 24 36.9	4.727
07	05 09 48.04	2.5593	27 25 30.9	4.403	07	07 18 12.32	2.7234	27 19 47.2	4.930
08	05 12 21.82	2.5664	27 29 50.0	4.233	08	07 20 55.69	2.7223	27 14 45.3	5.134
09	05 14 56.01	2.5733	27 33 58.9	4.063	09	07 23 38.99	2.7210	27 09 31.1	5.338
10	05 17 30.62	2.5803	27 37 57.5	3.889	10	07 26 22.21	2.7195	27 04 04.8	5.540
11	05 20 05.65	2.5871	27 41 45.6	3.714	11	07 29 05.33	2.7178	26 58 26.3	5.743
12	05 22 41.07	2.5937	27 45 23.2	3.538	12	07 31 48.34	2.7159	26 52 35.7	5.944
13	05 25 16.89	2.6003	27 48 50.2	3.362	13	07 34 31.24	2.7139	26 46 33.0	6.145
14	05 27 53.10	2.6067	27 52 06.6	3.183	14	07 37 14.01	2.7116	26 40 18.3	6.346
15	05 30 29.69	2.6129	27 55 12.1	3.002	15	07 39 56.63	2.7092	26 33 51.5	6.545
16	05 33 06.65	2.6190	27 58 06.8	2.820	16	07 42 39.11	2.7067	26 27 12.9	6.743
17	05 35 43.97	2.6249	28 00 50.5	2.638	17	07 45 21.43	2.7040	26 20 22.3	6.942
18	05 38 21.64	2.6308	28 03 23.3	2.454	18	07 48 03.59	2.7011	26 13 19.9	7.138
19	05 40 59.66	2.6365	28 05 45.0	2.268	19	07 50 45.56	2.6980	26 06 05.8	7.333
20	05 43 38.02	2.6421	28 07 55.5	2.082	20	07 53 27.35	2.6948	25 58 39.9	7.528
21	05 46 16.71	2.6474	28 09 54.8	1.893	21	07 56 08.94	2.6914	25 51 02.4	7.723
22	05 48 55.71	2.6526	28 11 42.7	1.704	22	07 58 50.32	2.6879	25 43 13.2	7.916
23	05 51 35.02	2.6578	28 13 19.3	1.514	23	08 01 31.49	2.6843	25 35 12.5	8.108
24	05 54 14.64	2.6628	+28 14 44.4	+1.323	24	08 04 12.43	2.6804	+25 27 00.3	-8.298

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Monday, February 2.					Wednesday, February 4.				
00	08 04 12.43	2.6804	+25 27 00.3	-8.298	00	10 06 39.21	2.4034	+15 40 11.6	-15.401
01	08 06 53.14	2.6765	25 18 36.8	8.487	01	10 09 03.23	2.3973	15 24 44.6	15.498
02	08 09 33.61	2.6723	25 10 01.9	8.676	02	10 11 26.88	2.3911	15 09 11.9	15.591
03	08 12 13.82	2.6681	25 01 15.7	8.863	03	10 13 50.16	2.3850	14 53 33.7	15.683
04	08 14 53.78	2.6638	24 52 18.4	9.048	04	10 16 13.08	2.3789	14 37 49.9	15.774
05	08 17 33.47	2.6593	24 43 10.0	9.231	05	10 18 35.63	2.3728	14 22 00.8	15.861
06	08 20 12.89	2.6547	24 33 50.7	9.413	06	10 20 57.82	2.3669	14 06 06.6	15.946
07	08 22 52.03	2.6499	24 24 20.4	9.595	07	10 23 19.66	2.3611	13 50 07.3	16.029
08	08 25 30.88	2.6452	24 14 39.3	9.774	08	10 25 41.15	2.3552	13 34 03.1	16.110
09	08 28 09.45	2.6403	24 04 47.5	9.953	09	10 28 02.28	2.3493	13 17 54.1	16.189
10	08 30 47.71	2.6351	23 54 45.0	10.129	10	10 30 23.06	2.3435	13 01 40.4	16.266
11	08 33 25.66	2.6299	23 44 32.0	10.304	11	10 32 43.50	2.3378	12 45 22.2	16.339
12	08 36 03.30	2.6247	23 34 08.5	10.478	12	10 35 03.60	2.3322	12 28 59.7	16.411
13	08 38 40.62	2.6193	23 23 34.7	10.649	13	10 37 23.36	2.3266	12 12 32.9	16.480
14	08 41 17.62	2.6139	23 12 50.6	10.818	14	10 39 42.79	2.3210	11 56 02.1	16.548
15	08 43 54.29	2.6083	23 01 56.5	10.986	15	10 42 01.88	2.3156	11 39 27.2	16.613
16	08 46 30.62	2.6027	22 50 52.3	11.153	16	10 44 20.66	2.3102	11 22 48.5	16.676
17	08 49 06.61	2.5970	22 39 38.1	11.318	17	10 46 39.10	2.3048	11 06 06.1	16.736
18	08 51 42.26	2.5913	22 28 14.2	11.479	18	10 48 57.24	2.2996	10 49 20.2	16.794
19	08 54 17.56	2.5854	22 16 40.6	11.640	19	10 51 15.05	2.2943	10 32 30.8	16.852
20	08 56 52.51	2.5796	22 04 57.4	11.799	20	10 53 32.56	2.2893	10 15 38.0	16.906
21	08 59 27.11	2.5737	21 53 04.7	11.956	21	10 55 49.76	2.2842	9 58 42.1	16.958
22	09 02 01.35	2.5676	21 41 02.7	12.111	22	10 58 06.66	2.2792	9 41 43.1	17.008
23	09 04 35.22	2.5615	+21 28 51.4	-12.265	23	11 00 23.26	2.2743	+9 24 41.2	-17.055
Tuesday, February 3.					Thursday, February 5.				
00	09 07 08.73	2.5554	+21 16 30.9	-12.416	00	11 02 39.57	2.2695	+9 07 36.5	-17.101
01	09 09 41.87	2.5493	21 04 01.5	12.564	01	11 04 55.60	2.2648	8 50 29.1	17.144
02	09 12 14.64	2.5430	20 51 23.2	12.712	02	11 07 11.34	2.2600	8 33 19.2	17.185
03	09 14 47.03	2.5368	20 38 36.1	12.857	03	11 09 26.80	2.2554	8 16 06.9	17.224
04	09 17 19.05	2.5305	20 25 40.4	12.999	04	11 11 41.99	2.2509	7 58 52.3	17.262
05	09 19 50.69	2.5242	20 12 36.2	13.140	05	11 13 56.91	2.2465	7 41 35.5	17.296
06	09 22 21.95	2.5179	19 59 23.6	13.279	06	11 16 11.57	2.2421	7 24 16.8	17.328
07	09 24 52.84	2.5116	19 46 02.7	13.416	07	11 18 25.96	2.2378	7 06 56.1	17.360
08	09 27 23.34	2.5052	19 32 33.7	13.549	08	11 20 40.10	2.2337	6 49 33.6	17.388
09	09 29 53.46	2.4988	19 18 56.8	13.682	09	11 22 54.00	2.2296	6 32 09.5	17.414
10	09 32 23.19	2.4923	19 05 11.9	13.813	10	11 25 07.65	2.2255	6 14 43.9	17.438
11	09 34 52.54	2.4859	18 51 19.3	13.940	11	11 27 21.06	2.2215	5 57 16.9	17.462
12	09 37 21.50	2.4795	18 37 19.1	14.066	12	11 29 34.23	2.2177	5 39 48.5	17.483
13	09 39 50.08	2.4731	18 23 11.4	14.189	13	11 31 47.18	2.2139	5 22 19.0	17.501
14	09 42 18.27	2.4667	18 08 56.4	14.310	14	11 33 59.90	2.2103	5 04 48.4	17.518
15	09 44 46.08	2.4603	17 54 34.2	14.429	15	11 36 12.41	2.2067	4 47 16.8	17.533
16	09 47 13.51	2.4539	17 40 04.9	14.547	16	11 38 24.70	2.2032	4 29 44.5	17.545
17	09 49 40.55	2.4475	17 25 28.6	14.662	17	11 40 36.79	2.1998	4 12 11.4	17.556
18	09 52 07.21	2.4412	17 10 45.5	14.773	18	11 42 48.67	2.1964	3 54 37.8	17.565
19	09 54 33.49	2.4348	16 55 55.8	14.883	19	11 45 00.36	2.1932	3 37 03.6	17.573
20	09 56 59.39	2.4285	16 40 59.5	14.992	20	11 47 11.85	2.1900	3 19 29.1	17.577
21	09 59 24.91	2.4223	16 25 56.8	15.098	21	11 49 23.16	2.1869	3 01 54.4	17.580
22	10 01 50.06	2.4159	16 10 47.8	15.201	22	11 51 34.28	2.1839	2 44 19.5	17.581
23	10 04 14.82	2.4096	15 55 32.7	15.302	23	11 53 45.23	2.1811	2 26 44.7	17.580
24	10 06 39.21	2.4034	+15 40 11.6	-15.401	24	11 55 56.01	2.1783	+2 09 09.9	-17.578

MOON, 1931.

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THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Friday, February 6.					Sunday, February 8.				
00	11 55 56.01	2.1783	+ 2 09 09.9	-17.578	00	13 38 57.31	2.1464	-11 19 43.7	-15.537
01	11 58 06.63	2.1757	1 51 35.3	17.574	01	13 41 06.13	2.1477	11 35 13.6	15.460
02	12 00 17.09	2.1730	1 34 01.0	17.568	02	13 43 15.03	2.1491	11 50 38.9	15.381
03	12 02 27.39	2.1704	1 16 27.2	17.559	03	13 45 24.02	2.1505	12 05 59.3	15.300
04	12 04 37.54	2.1680	0 58 53.9	17.550	04	13 47 33.09	2.1520	12 21 14.9	15.219
05	12 06 47.55	2.1658	0 41 21.2	17.538	05	13 49 42.26	2.1536	12 36 25.6	15.137
06	12 08 57.43	2.1635	0 23 49.3	17.525	06	13 51 51.52	2.1551	12 51 31.3	15.052
07	12 11 07.17	2.1613	+ 0 06 18.2	17.510	07	13 54 00.87	2.1568	13 06 31.9	14.968
08	12 13 16.78	2.1592	- 0 11 11.9	17.493	08	13 56 10.33	2.1586	13 21 27.4	14.881
09	12 15 26.27	2.1573	0 28 41.0	17.475	09	13 58 19.90	2.1604	13 36 17.6	14.793
10	12 17 35.65	2.1554	0 46 08.9	17.454	10	14 00 29.58	2.1623	13 51 02.6	14.705
11	12 19 44.92	2.1536	1 03 35.5	17.433	11	14 02 39.37	2.1641	14 05 42.2	14.615
12	12 21 54.08	2.1518	1 21 00.8	17.409	12	14 04 49.27	2.1660	14 20 16.4	14.524
13	12 24 03.14	2.1503	1 38 24.6	17.384	13	14 06 59.29	2.1680	14 34 45.1	14.432
14	12 26 12.11	2.1487	1 55 46.9	17.357	14	14 09 09.43	2.1701	14 49 08.2	14.338
15	12 28 20.98	2.1473	2 13 07.4	17.328	15	14 11 19.70	2.1722	15 03 25.7	14.244
16	12 30 29.78	2.1459	2 30 26.2	17.298	16	14 13 30.10	2.1743	15 17 37.5	14.148
17	12 32 38.49	2.1446	2 47 43.1	17.266	17	14 15 40.62	2.1766	15 31 43.5	14.052
18	12 34 47.13	2.1434	3 04 58.1	17.233	18	14 17 51.29	2.1789	15 45 43.7	13.954
19	12 36 55.70	2.1423	3 22 11.0	17.198	19	14 20 02.09	2.1812	15 59 38.0	13.855
20	12 39 04.21	2.1413	3 39 21.8	17.161	20	14 22 13.03	2.1835	16 13 26.3	13.754
21	12 41 12.66	2.1404	3 56 30.3	17.123	21	14 24 24.11	2.1859	16 27 08.5	13.653
22	12 43 21.06	2.1396	4 13 36.5	17.083	22	14 26 35.34	2.1883	16 40 44.6	13.551
23	12 45 29.41	2.1388	- 4 30 40.2	-17.041	23	14 28 46.71	2.1908	-16 54 14.6	-13.448
Saturday, February 7.					Monday, February 9.				
00	12 47 37.72	2.1382	- 4 47 41.4	-16.998	00	14 30 58.24	2.1934	-17 07 38.3	-13.343
01	12 49 45.99	2.1376	5 04 40.0	16.954	01	14 33 09.92	2.1959	17 20 55.7	13.237
02	12 51 54.23	2.1371	5 21 35.9	16.908	02	14 35 21.75	2.1985	17 34 06.7	13.130
03	12 54 02.44	2.1368	5 38 29.0	16.860	03	14 37 33.74	2.2012	17 47 11.3	13.023
04	12 56 10.64	2.1364	5 55 19.1	16.811	04	14 39 45.89	2.2038	18 00 09.5	12.915
05	12 58 18.81	2.1361	6 12 06.3	16.762	05	14 41 58.20	2.2065	18 13 01.1	12.805
06	13 00 26.97	2.1360	6 28 50.5	16.710	06	14 44 10.67	2.2093	18 25 46.1	12.694
07	13 02 35.13	2.1360	6 45 31.5	16.656	07	14 46 23.31	2.2120	18 38 24.4	12.583
08	13 04 43.29	2.1359	7 02 09.2	16.602	08	14 48 36.11	2.2148	18 50 56.0	12.470
09	13 06 51.44	2.1360	7 18 43.7	16.546	09	14 50 49.09	2.2177	19 03 20.8	12.357
10	13 08 59.61	2.1363	7 35 14.7	16.488	10	14 53 02.23	2.2204	19 15 38.8	12.242
11	13 11 07.79	2.1364	7 51 42.2	16.428	11	14 55 15.54	2.2233	19 27 49.8	12.125
12	13 13 15.98	2.1368	8 08 06.1	16.368	12	14 57 29.02	2.2262	19 39 53.8	12.008
13	13 15 24.20	2.1372	8 24 26.3	16.306	13	14 59 42.68	2.2291	19 51 50.8	11.891
14	13 17 32.44	2.1376	8 40 42.8	16.243	14	15 01 56.51	2.2319	20 03 40.7	11.773
15	13 19 40.71	2.1382	8 56 55.5	16.179	15	15 04 10.51	2.2348	20 15 23.5	11.653
16	13 21 49.02	2.1388	9 13 04.3	16.113	16	15 06 24.69	2.2378	20 26 59.0	11.533
17	13 23 57.37	2.1396	9 29 09.0	16.045	17	15 08 39.05	2.2408	20 38 27.4	11.413
18	13 26 05.77	2.1403	9 45 09.7	15.977	18	15 10 53.59	2.2438	20 49 48.5	11.289
19	13 28 14.21	2.1412	10 01 06.2	15.907	19	15 13 08.30	2.2467	21 01 02.1	11.165
20	13 30 22.71	2.1421	10 16 58.5	15.836	20	15 15 23.19	2.2497	21 12 08.3	11.041
21	13 32 31.26	2.1431	10 32 46.5	15.763	21	15 17 38.26	2.2527	21 23 07.0	10.916
22	13 34 39.88	2.1442	10 48 30.1	15.689	22	15 19 53.51	2.2557	21 33 58.2	10.790
23	13 36 48.56	2.1453	11 04 09.2	15.613	23	15 22 08.94	2.2587	21 44 41.8	10.663
24	13 38 57.31	2.1464	-11 19 43.7	-15.537	24	15 24 24.55	2.2617	-21 55 17.8	-10.536

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Tuesday, February 10.					Thursday, February 12.				
00	15 24 24.55	2.2617	-21 55 17.8	-10.536	00	17 15 53.84	2.3643	-27 40 24.8	-3.635
01	15 26 40.34	2.2646	22 05 46.1	10.408	01	17 18 15.72	2.3649	27 43 58.3	3.481
02	15 28 56.30	2.2676	22 16 06.7	10.278	02	17 20 37.63	2.3654	27 47 22.5	3.327
03	15 31 12.45	2.2706	22 26 19.5	10.148	03	17 22 59.57	2.3658	27 50 37.5	3.173
04	15 33 28.77	2.2735	22 36 24.5	10.018	04	17 25 21.52	2.3660	27 53 43.3	3.019
05	15 35 45.27	2.2765	22 46 21.6	9.885	05	17 27 43.49	2.3663	27 56 39.8	2.865
06	15 38 01.95	2.2794	22 56 10.7	9.752	06	17 30 05.47	2.3664	27 59 27.1	2.711
07	15 40 18.80	2.2823	23 05 51.8	9.619	07	17 32 27.46	2.3664	28 02 05.1	2.556
08	15 42 35.83	2.2852	23 15 25.0	9.485	08	17 34 49.44	2.3663	28 04 33.8	2.402
09	15 44 53.02	2.2880	23 24 50.0	9.350	09	17 37 11.41	2.3661	28 06 53.3	2.248
10	15 47 10.39	2.2910	23 34 07.0	9.214	10	17 39 33.37	2.3658	28 09 03.5	2.093
11	15 49 27.94	2.2938	23 43 15.7	9.078	11	17 41 55.31	2.3655	28 11 04.5	1.939
12	15 51 45.65	2.2966	23 52 16.3	8.941	12	17 44 17.23	2.3651	28 12 56.2	1.785
13	15 54 03.53	2.2993	24 01 08.6	8.803	13	17 46 39.12	2.3645	28 14 38.7	1.631
14	15 56 21.57	2.3021	24 09 52.6	8.664	14	17 49 00.97	2.3638	28 16 11.9	1.477
15	15 58 39.78	2.3048	24 18 28.3	8.525	15	17 51 22.78	2.3631	28 17 35.9	1.323
16	16 00 58.15	2.3075	24 26 55.6	8.385	16	17 53 44.54	2.3622	28 18 50.7	1.169
17	16 03 16.68	2.3102	24 35 14.5	8.244	17	17 56 06.24	2.3613	28 19 56.2	1.016
18	16 05 35.37	2.3128	24 43 24.9	8.103	18	17 58 27.89	2.3603	28 20 52.6	0.863
19	16 07 54.21	2.3153	24 51 26.9	7.962	19	18 00 49.47	2.3591	28 21 39.7	0.709
20	16 10 13.21	2.3178	24 59 20.3	7.818	20	18 03 10.98	2.3578	28 22 17.7	0.557
21	16 12 32.35	2.3203	25 07 05.1	7.675	21	18 05 32.41	2.3565	28 22 46.6	0.404
22	16 14 51.65	2.3228	25 14 41.3	7.532	22	18 07 53.76	2.3551	28 23 06.2	0.252
23	16 17 11.09	2.3252	-25 22 08.9	-7.388	23	18 10 15.02	2.3536	-28 23 16.8	-0.100
Wednesday, February 11.					Friday, February 13.				
00	16 19 30.67	2.3275	-25 29 27.8	-7.243	00	18 12 36.19	2.3520	-28 23 18.2	+0.052
01	16 21 50.39	2.3298	25 36 38.0	7.098	01	18 14 57.26	2.3503	28 23 10.5	0.203
02	16 24 10.25	2.3321	25 43 39.5	6.952	02	18 17 18.22	2.3483	28 22 53.8	0.355
03	16 26 30.24	2.3343	25 50 32.2	6.805	03	18 19 39.06	2.3464	28 22 27.9	0.506
04	16 28 50.36	2.3364	25 57 16.1	6.658	04	18 21 59.79	2.3445	28 21 53.1	0.656
05	16 31 10.61	2.3384	26 03 51.1	6.510	05	18 24 20.40	2.3424	28 21 09.2	0.807
06	16 33 30.97	2.3404	26 10 17.3	6.363	06	18 26 40.88	2.3402	28 20 16.3	0.956
07	16 35 51.46	2.3424	26 16 34.6	6.214	07	18 29 01.22	2.3379	28 19 14.5	1.104
08	16 38 12.06	2.3443	26 22 43.0	6.065	08	18 31 21.43	2.3355	28 18 03.8	1.253
09	16 40 32.78	2.3461	26 28 42.4	5.916	09	18 33 41.48	2.3330	28 16 44.1	1.402
10	16 42 53.59	2.3478	26 34 32.9	5.766	10	18 36 01.39	2.3305	28 15 15.6	1.549
11	16 45 14.52	2.3496	26 40 14.3	5.615	11	18 38 21.14	2.3278	28 13 38.2	1.697
12	16 47 35.54	2.3512	26 45 46.7	5.465	12	18 40 40.73	2.3252	28 11 52.0	1.843
13	16 49 56.66	2.3527	26 51 10.1	5.314	13	18 43 00.16	2.3223	28 09 57.0	1.990
14	16 52 17.86	2.3541	26 56 24.4	5.163	14	18 45 19.41	2.3193	28 07 53.2	2.136
15	16 54 39.15	2.3556	27 01 29.6	5.011	15	18 47 38.48	2.3163	28 05 40.7	2.280
16	16 57 00.53	2.3569	27 06 25.7	4.859	16	18 49 57.37	2.3133	28 03 19.6	2.425
17	16 59 21.98	2.3581	27 11 12.7	4.707	17	18 52 16.07	2.3101	28 00 49.7	2.569
18	17 01 43.50	2.3592	27 15 50.5	4.554	18	18 54 34.58	2.3068	27 58 11.3	2.713
19	17 04 05.08	2.3603	27 20 19.2	4.402	19	18 56 52.89	2.3035	27 55 24.2	2.855
20	17 06 26.73	2.3613	27 24 38.7	4.248	20	18 59 11.00	2.3002	27 52 28.7	2.997
21	17 08 48.44	2.3622	27 28 49.0	4.096	21	19 01 28.91	2.2967	27 49 24.6	3.138
22	17 11 10.19	2.3630	27 32 50.2	3.943	22	19 03 46.60	2.2931	27 46 12.1	3.279
23	17 13 32.00	2.3638	27 36 42.1	3.788	23	19 06 04.08	2.2895	27 42 51.1	3.419
24	17 15 53.84	2.3643	-27 40 24.8	-3.635	24	19 08 21.34	2.2858	-27 39 21.8	+3.558

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Saturday, February 14.					Monday, February 16.				
00	19 08 21.34	2.2858	-27 39 21.8	+ 3.558	00	20 52 48.90	2.0549	-22 24 02.4	+ 9.223
01	19 10 38.38	2.2820	27 35 44.1	3.697	01	20 54 52.04	2.0498	22 14 46.2	9.317
02	19 12 55.18	2.2782	27 31 58.2	3.834	02	20 56 54.87	2.0445	22 05 24.4	9.409
03	19 15 11.76	2.2743	27 28 04.0	3.972	03	20 58 57.38	2.0393	21 55 57.1	9.502
04	19 17 28.09	2.2703	27 24 01.6	4.108	04	21 00 59.58	2.0342	21 46 24.2	9.593
05	19 19 44.19	2.2663	27 19 51.0	4.243	05	21 03 01.48	2.0290	21 36 45.9	9.683
06	19 22 00.04	2.2621	27 15 32.4	4.378	06	21 05 03.06	2.0238	21 27 02.2	9.773
07	19 24 15.64	2.2579	27 11 05.6	4.513	07	21 07 04.34	2.0188	21 17 13.2	9.861
08	19 26 30.99	2.2538	27 06 30.9	4.645	08	21 09 05.31	2.0137	21 07 18.9	9.948
09	19 28 46.09	2.2494	27 01 48.2	4.778	09	21 11 05.98	2.0086	20 57 19.4	10.034
10	19 31 00.92	2.2450	26 56 57.5	4.910	10	21 13 06.34	2.0034	20 47 14.8	10.119
11	19 33 15.49	2.2407	26 51 59.0	5.040	11	21 15 06.39	1.9984	20 37 05.1	10.203
12	19 35 29.80	2.2363	26 46 52.7	5.170	12	21 17 06.15	1.9935	20 26 50.4	10.287
13	19 37 43.84	2.2317	26 41 38.6	5.299	13	21 19 05.61	1.9884	20 16 30.7	10.368
14	19 39 57.60	2.2271	26 36 16.8	5.427	14	21 21 04.76	1.9834	20 06 06.2	10.449
15	19 42 11.09	2.2225	26 30 47.4	5.554	15	21 23 03.62	1.9786	19 55 36.8	10.530
16	19 44 24.30	2.2178	26 25 10.3	5.682	16	21 25 02.19	1.9737	19 45 02.6	10.609
17	19 46 37.23	2.2132	26 19 25.6	5.807	17	21 27 00.46	1.9688	19 34 23.7	10.688
18	19 48 49.88	2.2084	26 13 33.5	5.931	18	21 28 58.44	1.9639	19 23 40.1	10.764
19	19 51 02.24	2.2036	26 07 33.9	6.055	19	21 30 56.13	1.9591	19 12 52.0	10.841
20	19 53 14.31	2.1988	26 01 26.9	6.178	20	21 32 53.53	1.9543	19 01 59.2	10.917
21	19 55 26.10	2.1940	25 55 12.6	6.299	21	21 34 50.65	1.9496	18 51 02.0	10.990
22	19 57 37.59	2.1890	25 48 51.0	6.420	22	21 36 47.48	1.9448	18 40 00.4	11.063
23	19 59 48.78	2.1841	-25 42 22.2	+ 6.540	23	21 38 44.03	1.9402	-18 28 54.4	+ 11.136
Sunday, February 15.					Tuesday, February 17.				
00	20 01 59.68	2.1792	-25 35 46.2	+ 6.659	00	21 40 40.30	1.9355	-18 17 44.1	+ 11.207
01	20 04 10.28	2.1742	25 29 03.1	6.778	01	21 42 36.29	1.9309	18 06 29.6	11.278
02	20 06 20.58	2.1692	25 22 12.9	6.895	02	21 44 32.01	1.9263	17 55 10.8	11.348
03	20 08 30.58	2.1641	25 15 15.7	7.011	03	21 46 27.45	1.9218	17 43 47.9	11.415
04	20 10 40.27	2.1590	25 08 11.6	7.126	04	21 48 22.63	1.9173	17 32 21.0	11.483
05	20 12 49.66	2.1539	25 01 00.6	7.240	05	21 50 17.53	1.9128	17 20 50.0	11.550
06	20 14 58.74	2.1488	24 53 42.8	7.353	06	21 52 12.17	1.9085	17 09 15.0	11.615
07	20 17 07.52	2.1437	24 46 18.2	7.466	07	21 54 06.55	1.9042	16 57 36.2	11.679
08	20 19 15.98	2.1385	24 38 46.9	7.578	08	21 56 00.67	1.8998	16 45 53.5	11.743
09	20 21 24.14	2.1334	24 31 08.9	7.688	09	21 57 54.52	1.8955	16 34 07.0	11.807
10	20 23 31.99	2.1282	24 23 24.3	7.797	10	21 59 48.13	1.8913	16 22 16.7	11.868
11	20 25 39.52	2.1229	24 15 33.3	7.905	11	22 01 41.48	1.8871	16 10 22.8	11.928
12	20 27 46.74	2.1178	24 07 35.7	8.013	12	22 03 34.58	1.8829	15 58 25.3	11.988
13	20 29 53.65	2.1125	23 59 31.7	8.119	13	22 05 27.43	1.8788	15 46 24.2	12.048
14	20 32 00.24	2.1073	23 51 21.4	8.223	14	22 07 20.04	1.8748	15 34 19.5	12.107
15	20 34 06.52	2.1021	23 43 04.9	8.328	15	22 09 12.41	1.8708	15 22 11.4	12.163
16	20 36 12.49	2.0968	23 34 42.0	8.433	16	22 11 04.54	1.8669	15 09 59.9	12.219
17	20 38 18.14	2.0916	23 26 13.0	8.534	17	22 12 56.44	1.8630	14 57 45.1	12.275
18	20 40 23.48	2.0863	23 17 37.9	8.635	18	22 14 48.10	1.8591	14 45 26.9	12.330
19	20 42 28.50	2.0811	23 08 56.8	8.736	19	22 16 39.53	1.8553	14 33 05.5	12.383
20	20 44 33.21	2.0758	23 00 09.6	8.835	20	22 18 30.74	1.8517	14 20 40.9	12.436
21	20 46 37.60	2.0706	22 51 16.6	8.933	21	22 20 21.73	1.8479	14 08 13.2	12.488
22	20 48 41.68	2.0654	22 42 17.6	9.031	22	22 22 12.49	1.8443	13 55 42.4	12.538
23	20 50 45.45	2.0602	22 33 12.9	9.127	23	22 24 03.04	1.8407	13 43 08.6	12.588
24	20 52 48.90	2.0549	-22 24 02.4	+ 9.223	24	22 25 53.37	1.8371	-13 30 31.8	+ 12.638

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Wednesday, February 18.					Friday, February 20.				
00	^h 22 ^m 25 ^s 53·37	1·8371	— 13° 30' 31·8"	+ 12·638	00	^h 23 ^m 51 ^s 06·66	1·7378	— 2° 42' 58·4"	+ 14·041
01	22 27 43·49	1·8337	13 17 52·1	12·686	01	23 52 50·91	1·7373	2 28 55·6	14·052
02	22 29 33·41	1·8303	13 05 09·5	12·733	02	23 54 35·13	1·7368	2 14 52·2	14·062
03	22 31 23·12	1·8268	12 52 24·1	12·780	03	23 56 19·32	1·7364	2 00 48·2	14·071
04	22 33 12·63	1·8236	12 39 35·9	12·826	04	23 58 03·50	1·7362	1 46 43·7	14·079
05	22 35 01·95	1·8203	12 26 45·0	12·871	05	23 59 47·66	1·7359	1 32 38·7	14·087
06	22 36 51·07	1·8171	12 13 51·4	12·915	06	00 01 31·81	1·7358	1 18 33·3	14·094
07	22 38 40·00	1·8139	12 00 55·2	12·958	07	00 03 15·96	1·7358	1 04 27·4	14·100
08	22 40 28·74	1·8108	11 47 56·4	13·001	08	00 05 00·10	1·7357	0 50 21·3	14·105
09	22 42 17·29	1·8078	11 34 55·1	13·042	09	00 06 44·24	1·7358	0 36 14·8	14·110
10	22 44 05·67	1·8048	11 21 51·4	13·083	10	00 08 28·39	1·7359	0 22 08·1	14·114
11	22 45 53·87	1·8019	11 08 45·2	13·123	11	00 10 12·55	1·7361	— 0 08 01·1	14·118
12	22 47 41·90	1·7991	10 55 36·7	13·161	12	00 11 56·72	1·7363	+ 0 06 06·0	14·120
13	22 49 29·76	1·7963	10 42 25·9	13·199	13	00 13 40·91	1·7367	0 20 13·3	14·122
14	22 51 17·45	1·7935	10 29 12·8	13·237	14	00 15 25·12	1·7371	0 34 20·6	14·123
15	22 53 04·98	1·7908	10 15 57·5	13·273	15	00 17 09·36	1·7376	0 48 28·0	14·123
16	22 54 52·35	1·7883	10 02 40·0	13·309	16	00 18 53·63	1·7381	1 02 35·4	14·123
17	22 56 39·57	1·7857	9 49 20·4	13·344	17	00 20 37·93	1·7387	1 16 42·7	14·122
18	22 58 26·63	1·7831	9 35 58·7	13·378	18	00 22 22·27	1·7393	1 30 50·0	14·121
19	23 00 13·54	1·7808	9 22 35·0	13·412	19	00 24 06·65	1·7401	1 44 57·2	14·118
20	23 02 00·32	1·7784	9 09 09·3	13·444	20	00 25 51·08	1·7410	1 59 04·1	14·114
21	23 03 46·95	1·7760	8 55 41·7	13·476	21	00 27 35·57	1·7419	2 13 10·9	14·111
22	23 05 33·44	1·7738	8 42 12·2	13·507	22	00 29 20·11	1·7428	2 27 17·4	14·106
23	23 07 19·80	1·7716	— 8 28 40·9	+ 13·537	23	00 31 04·71	1·7438	+ 2 41 23·6	+ 14·100
Thursday, February 19.					Saturday, February 21.				
00	23 09 06·03	1·7695	— 8 15 07·8	+ 13·566	00	00 32 49·37	1·7449	+ 2 55 29·4	+ 14·094
01	23 10 52·14	1·7674	8 01 33·0	13·595	01	00 34 34·10	1·7461	3 09 34·9	14·088
02	23 12 38·12	1·7654	7 47 56·4	13·623	02	00 36 18·90	1·7473	3 23 39·9	14·080
03	23 14 23·99	1·7635	7 34 18·3	13·649	03	00 38 03·78	1·7487	3 37 44·5	14·072
04	23 16 09·74	1·7616	7 20 38·5	13·676	04	00 39 48·74	1·7501	3 51 48·5	14·062
05	23 17 55·38	1·7598	7 06 57·2	13·701	05	00 41 33·79	1·7516	4 05 51·9	14·053
06	23 19 40·91	1·7580	6 53 14·4	13·726	06	00 43 18·93	1·7532	4 19 54·8	14·043
07	23 21 26·34	1·7563	6 39 30·1	13·750	07	00 45 04·17	1·7548	4 33 57·0	14·031
08	23 23 11·67	1·7548	6 25 44·4	13·773	08	00 46 49·51	1·7565	4 47 58·5	14·019
09	23 24 56·91	1·7532	6 11 57·4	13·795	09	00 48 34·95	1·7583	5 01 59·3	14·007
10	23 26 42·05	1·7517	5 58 09·0	13·817	10	00 50 20·50	1·7601	5 15 59·3	13·993
11	23 28 27·11	1·7503	5 44 19·4	13·838	11	00 52 06·16	1·7620	5 29 58·4	13·978
12	23 30 12·08	1·7488	5 30 28·5	13·858	12	00 53 51·94	1·7640	5 43 56·7	13·963
13	23 31 56·97	1·7476	5 16 36·4	13·878	13	00 55 37·84	1·7660	5 57 54·0	13·948
14	23 33 41·79	1·7463	5 02 43·2	13·896	14	00 57 23·86	1·7682	6 11 50·4	13·931
15	23 35 26·53	1·7452	4 48 48·9	13·913	15	00 59 10·02	1·7704	6 25 45·7	13·913
16	23 37 11·21	1·7441	4 34 53·6	13·931	16	01 00 56·31	1·7727	6 39 40·0	13·896
17	23 38 55·82	1·7431	4 20 57·2	13·948	17	01 02 42·74	1·7750	6 53 33·2	13·878
18	23 40 40·38	1·7421	4 06 59·9	13·963	18	01 04 29·31	1·7774	7 07 25·3	13·858
19	23 42 24·87	1·7412	3 53 01·7	13·978	19	01 06 16·03	1·7799	7 21 16·1	13·837
20	23 44 09·32	1·7404	3 39 02·6	13·992	20	01 08 02·90	1·7825	7 35 05·7	13·816
21	23 45 53·72	1·7396	3 25 02·7	14·005	21	01 09 49·93	1·7851	7 48 54·0	13·794
22	23 47 38·07	1·7388	3 11 02·0	14·018	22	01 11 37·11	1·7878	8 02 41·0	13·772
23	23 49 22·38	1·7383	2 57 00·5	14·030	23	01 13 24·47	1·7907	8 16 26·6	13·748
24	23 51 06·66	1·7378	— 2 42 58·4	+ 14·041	24	01 15 11·99	1·7935	+ 8 30 10·7	+ 13·723

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Sunday, February 22.					Tuesday, February 24.				
00	01 15 11.99	1.7935	+ 8 30 10.7	+13.723	00	02 45 59.63	2.0173	+18 44 22.8	+11.499
01	01 16 59.69	1.7964	8 43 53.4	13.698	01	02 48 00.86	2.0237	18 55 50.6	11.428
02	01 18 47.56	1.7994	8 57 34.5	13.673	02	02 50 02.47	2.0301	19 07 14.2	11.356
03	01 20 35.62	1.8025	9 11 14.1	13.646	03	02 52 04.47	2.0366	19 18 33.3	11.282
04	01 22 23.86	1.8055	9 24 52.0	13.618	04	02 54 06.86	2.0431	19 29 48.0	11.207
05	01 24 12.28	1.8088	9 38 28.3	13.590	05	02 56 09.64	2.0497	19 40 58.1	11.130
06	01 26 00.92	1.8123	9 52 02.8	13.561	06	02 58 12.82	2.0564	19 52 03.6	11.053
07	01 27 49.76	1.8157	10 05 35.6	13.531	07	03 00 16.41	2.0631	20 03 04.4	10.974
08	01 29 38.80	1.8191	10 19 06.5	13.499	08	03 02 20.39	2.0698	20 14 00.5	10.894
09	01 31 28.05	1.8226	10 32 35.5	13.468	09	03 04 24.79	2.0767	20 24 51.7	10.813
10	01 33 17.51	1.8262	10 46 02.6	13.436	10	03 06 29.59	2.0835	20 35 38.0	10.730
11	01 35 07.19	1.8299	10 59 27.8	13.403	11	03 08 34.81	2.0904	20 46 19.3	10.646
12	01 36 57.10	1.8337	11 12 50.9	13.368	12	03 10 40.44	2.0973	20 56 55.5	10.561
13	01 38 47.23	1.8375	11 26 11.9	13.333	13	03 12 46.49	2.1044	21 07 26.6	10.475
14	01 40 37.60	1.8415	11 39 30.9	13.298	14	03 14 52.97	2.1115	21 17 52.5	10.388
15	01 42 28.21	1.8454	11 52 47.6	13.260	15	03 16 59.87	2.1185	21 28 13.1	10.298
16	01 44 19.05	1.8494	12 06 02.1	13.223	16	03 19 07.19	2.1257	21 38 28.3	10.208
17	01 46 10.14	1.8536	12 19 14.3	13.183	17	03 21 14.95	2.1329	21 48 38.1	10.117
18	01 48 01.48	1.8578	12 32 24.1	13.143	18	03 23 23.14	2.1402	21 58 42.3	10.023
19	01 49 53.08	1.8622	12 45 31.5	13.103	19	03 25 31.77	2.1474	22 08 40.9	9.929
20	01 51 44.94	1.8664	12 58 36.5	13.063	20	03 27 40.83	2.1548	22 18 33.8	9.833
21	01 53 37.05	1.8708	13 11 39.0	13.020	21	03 29 50.34	2.1621	22 28 20.9	9.737
22	01 55 29.44	1.8754	13 24 38.9	12.977	22	03 32 00.28	2.1694	22 38 02.2	9.638
23	01 57 22.10	1.8799	+13 37 36.2	+12.933	23	03 34 10.67	2.1769	+22 47 37.5	+ 9.538
Monday, February 23.					Wednesday, February 25.				
00	01 59 15.03	1.8846	+13 50 30.8	+12.888	00	03 36 21.51	2.1843	+22 57 06.8	+ 9.438
01	02 01 08.25	1.8893	14 03 22.7	12.842	01	03 38 32.79	2.1918	23 06 30.0	9.335
02	02 03 01.75	1.8941	14 16 11.8	12.794	02	03 40 44.52	2.1993	23 15 47.0	9.231
03	02 04 55.54	1.8989	14 28 58.0	12.746	03	03 42 56.71	2.2068	23 24 57.7	9.126
04	02 06 49.62	1.9038	14 41 41.3	12.698	04	03 45 09.34	2.2144	23 34 02.1	9.019
05	02 08 44.00	1.9089	14 54 21.7	12.648	05	03 47 22.44	2.2220	23 43 00.0	8.911
06	02 10 38.69	1.9140	15 06 59.1	12.597	06	03 49 35.98	2.2295	23 51 51.4	8.802
07	02 12 33.68	1.9192	15 19 33.3	12.544	07	03 51 49.98	2.2372	24 00 36.2	8.690
08	02 14 28.99	1.9244	15 32 04.4	12.492	08	03 54 04.44	2.2448	24 09 14.2	8.578
09	02 16 24.61	1.9297	15 44 32.3	12.438	09	03 56 19.35	2.2524	24 17 45.5	8.464
10	02 18 20.55	1.9351	15 56 57.0	12.383	10	03 58 34.73	2.2601	24 26 09.9	8.348
11	02 20 16.82	1.9405	16 09 18.3	12.327	11	04 00 50.56	2.2677	24 34 27.3	8.232
12	02 22 13.41	1.9459	16 21 36.2	12.269	12	04 03 06.85	2.2753	24 42 37.7	8.114
13	02 24 10.33	1.9515	16 33 50.6	12.212	13	04 05 23.60	2.2830	24 50 41.0	7.994
14	02 26 07.59	1.9573	16 46 01.6	12.153	14	04 07 40.81	2.2906	24 58 37.0	7.873
15	02 28 05.20	1.9630	16 58 08.9	12.092	15	04 09 58.47	2.2983	25 06 25.7	7.750
16	02 30 03.15	1.9688	17 10 12.6	12.031	16	04 12 16.60	2.3060	25 14 07.0	7.627
17	02 32 01.45	1.9746	17 22 12.6	11.968	17	04 14 35.19	2.3136	25 21 40.9	7.501
18	02 34 00.10	1.9805	17 34 08.8	11.904	18	04 16 54.23	2.3212	25 29 07.1	7.373
19	02 35 59.11	1.9864	17 46 01.1	11.839	19	04 19 13.73	2.3288	25 36 25.7	7.245
20	02 37 58.47	1.9925	17 57 49.5	11.774	20	04 21 33.69	2.3364	25 43 36.5	7.114
21	02 39 58.21	1.9987	18 09 34.0	11.708	21	04 23 54.10	2.3439	25 50 39.4	6.983
22	02 41 58.31	2.0048	18 21 14.4	11.639	22	04 26 14.96	2.3515	25 57 34.4	6.850
23	02 43 58.78	2.0110	18 32 50.7	11.570	23	04 28 36.28	2.3591	26 04 21.4	6.716
24	02 45 59.63	2.0173	+18 44 22.8	+11.499	24	04 30 58.05	2.3666	+26 11 00.3	+ 6.580

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Thursday, February 26.					Saturday, February 28.				
00	h m s 04 30 58.05	2.3666	+26 11 00.3	+ 6.580	00	h m s 06 31 55.01	2.6328	+28 23 57.5	- 1.494
01	04 33 20.27	2.3740	26 17 31.0	6.442	01	06 34 33.05	2.6352	28 22 22.1	1.687
02	04 35 42.93	2.3815	26 23 53.3	6.303	02	06 37 11.23	2.6374	28 20 35.1	1.870
03	04 38 06.05	2.3889	26 30 07.3	6.163	03	06 39 49.54	2.6395	28 18 36.6	2.073
04	04 40 29.60	2.3962	26 36 12.8	6.021	04	06 42 27.97	2.6415	28 16 26.4	2.267
05	04 42 53.59	2.4035	26 42 09.8	5.878	05	06 45 06.52	2.6433	28 14 04.6	2.461
06	04 45 18.02	2.4108	26 47 58.1	5.733	06	06 47 45.17	2.6449	28 11 31.1	2.655
07	04 47 42.89	2.4180	26 53 37.7	5.586	07	06 50 23.91	2.6464	28 08 46.0	2.849
08	04 50 08.18	2.4251	26 59 08.4	5.438	08	06 53 02.74	2.6478	28 05 49.2	3.044
09	04 52 33.90	2.4323	27 04 30.3	5.289	09	06 55 41.64	2.6488	28 02 40.7	3.239
10	04 55 00.05	2.4393	27 09 43.1	5.138	10	06 58 20.60	2.6498	27 59 20.5	3.434
11	04 57 26.62	2.4463	27 14 46.9	4.987	11	07 00 59.62	2.6508	27 55 48.6	3.630
12	04 59 53.61	2.4533	27 19 41.5	4.833	12	07 03 38.69	2.6514	27 52 04.9	3.826
13	05 02 21.01	2.4601	27 24 26.9	4.678	13	07 06 17.79	2.6519	27 48 09.5	4.022
14	05 04 48.82	2.4669	27 29 02.9	4.522	14	07 08 56.92	2.6523	27 44 02.3	4.218
15	05 07 17.04	2.4736	27 33 29.5	4.364	15	07 11 36.06	2.6523	27 39 43.4	4.413
16	05 09 45.65	2.4802	27 37 46.6	4.205	16	07 14 15.20	2.6523	27 35 12.7	4.609
17	05 12 14.66	2.4868	27 41 54.1	4.044	17	07 16 54.34	2.6523	27 30 30.3	4.804
18	05 14 44.06	2.4932	27 45 51.9	3.883	18	07 19 33.47	2.6520	27 25 36.2	4.999
19	05 17 13.84	2.4995	27 49 40.0	3.720	19	07 22 12.58	2.6515	27 20 30.4	5.194
20	05 19 44.00	2.5058	27 53 18.3	3.556	20	07 24 51.65	2.6508	27 15 12.9	5.388
21	05 22 14.54	2.5120	27 56 46.7	3.390	21	07 27 30.68	2.6501	27 09 43.8	5.583
22	05 24 45.44	2.5181	28 00 05.1	3.223	22	07 30 09.66	2.6493	27 04 02.9	5.778
23	05 27 16.71	2.5241	+28 03 13.5	+ 3.055	23	07 32 48.59	2.6482	+26 58 10.4	- 5.972
Friday, February 27.					Sunday, March 1.				
00	05 29 48.33	2.5299	+28 06 11.7	+ 2.886	00	07 35 27.44	2.6469	+26 52 06.3	- 6.165
01	05 32 20.30	2.5358	28 08 59.8	2.715	01	07 38 06.22	2.6455	26 45 50.6	6.358
02	05 34 52.62	2.5414	28 11 37.5	2.543	02	07 40 44.90	2.6439	26 39 23.3	6.551
03	05 37 25.27	2.5469	28 14 04.9	2.369	03	07 43 23.49	2.6423	26 32 44.5	6.743
04	05 39 58.25	2.5523	28 16 21.8	2.195	04	07 46 01.98	2.6405	26 25 54.1	6.935
05	05 42 31.55	2.5577	28 18 28.3	2.020	05	07 48 40.35	2.6386	26 18 52.3	7.125
06	05 45 05.17	2.5629	28 20 24.2	1.843	06	07 51 18.61	2.6365	26 11 39.1	7.315
07	05 47 39.10	2.5679	28 22 09.5	1.666	07	07 53 56.73	2.6343	26 04 14.5	7.504
08	05 50 13.32	2.5728	28 23 44.1	1.488	08	07 56 34.72	2.6320	25 56 38.6	7.693
09	05 52 47.84	2.5777	28 25 08.0	1.308	09	07 59 12.57	2.6295	25 48 51.4	7.881
10	05 55 22.64	2.5823	28 26 21.1	1.128	10	08 01 50.26	2.6268	25 40 52.9	8.068
11	05 57 57.71	2.5868	28 27 23.3	0.945	11	08 04 27.79	2.6241	25 32 43.2	8.254
12	06 00 33.06	2.5913	28 28 14.5	0.763	12	08 07 05.15	2.6213	25 24 22.4	8.439
13	06 03 08.67	2.5956	28 28 54.8	0.579	13	08 09 42.34	2.6183	25 15 50.5	8.623
14	06 05 44.53	2.5997	28 29 24.0	0.394	14	08 12 19.35	2.6152	25 07 07.6	8.807
15	06 08 20.63	2.6037	28 29 42.1	0.208	15	08 14 56.16	2.6120	24 58 13.7	8.990
16	06 10 56.97	2.6075	28 29 49.0	+ 0.022	16	08 17 32.79	2.6088	24 49 08.8	9.171
17	06 13 33.53	2.6111	28 29 44.7	- 0.165	17	08 20 09.21	2.6053	24 39 53.2	9.350
18	06 16 10.30	2.6147	28 29 29.2	0.353	18	08 22 45.42	2.6018	24 30 26.8	9.530
19	06 18 47.29	2.6181	28 29 02.4	0.541	19	08 25 21.42	2.5982	24 20 49.6	9.708
20	06 21 24.47	2.6213	28 28 24.3	0.731	20	08 27 57.20	2.5944	24 11 01.9	9.883
21	06 24 01.84	2.6244	28 27 34.7	0.921	21	08 30 32.75	2.5906	24 01 03.6	10.059
22	06 26 39.40	2.6273	28 26 33.8	1.111	22	08 33 08.07	2.5868	23 50 54.8	10.233
23	06 29 17.12	2.6301	28 25 21.4	1.303	23	08 35 43.16	2.5828	23 40 35.6	10.407
24	06 31 55.01	2.6328	+28 23 57.5	- 1.494	24	08 38 18.00	2.5786	+23 30 06.0	-10.578

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Monday, March 2.					Wednesday, March 4.				
00	^h 08 ^m 38 ^s 18.00	2.5786	+23 30 06.0	-10.578	00	^h 10 36 33.78	2.3470	+12 16 48.2	-16.731
01	08 40 52.59	2.5744	23 19 26.2	10.748	01	10 38 54.47	2.3426	12 00 02.0	16.809
02	08 43 26.93	2.5703	23 08 36.2	10.917	02	10 41 14.89	2.3382	11 43 11.1	16.885
03	08 46 01.02	2.5659	22 57 36.2	11.084	03	10 43 35.05	2.3338	11 26 15.8	16.958
04	08 48 34.84	2.5615	22 46 26.1	11.250	04	10 45 54.95	2.3296	11 09 16.1	17.029
05	08 51 08.40	2.5571	22 35 06.2	11.414	05	10 48 14.60	2.3255	10 52 12.3	17.098
06	08 53 41.69	2.5526	22 23 36.4	11.578	06	10 50 34.01	2.3213	10 35 04.3	17.165
07	08 56 14.71	2.5480	22 11 56.9	11.738	07	10 52 53.16	2.3173	10 17 52.5	17.229
08	08 58 47.45	2.5433	22 00 07.9	11.897	08	10 55 12.08	2.3133	10 00 36.8	17.293
09	09 01 19.91	2.5387	21 48 09.3	12.056	09	10 57 30.75	2.3093	9 43 17.4	17.352
10	09 03 52.09	2.5340	21 36 01.2	12.213	10	10 59 49.19	2.3053	9 25 54.6	17.409
11	09 06 23.99	2.5292	21 23 43.8	12.367	11	11 02 07.39	2.3015	9 08 28.3	17.466
12	09 08 55.59	2.5243	21 11 17.2	12.519	12	11 04 25.37	2.2978	8 50 58.7	17.519
13	09 11 26.91	2.5195	20 58 41.5	12.671	13	11 06 43.13	2.2942	8 33 26.0	17.570
14	09 13 57.93	2.5145	20 45 56.7	12.821	14	11 09 00.67	2.2905	8 15 50.3	17.618
15	09 16 28.65	2.5096	20 33 03.0	12.968	15	11 11 17.99	2.2869	7 58 11.8	17.665
16	09 18 59.08	2.5047	20 20 00.5	13.114	16	11 13 35.10	2.2835	7 40 30.5	17.711
17	09 21 29.21	2.4997	20 06 49.3	13.258	17	11 15 52.01	2.2802	7 22 46.5	17.753
18	09 23 59.04	2.4947	19 53 29.5	13.400	18	11 18 08.72	2.2768	7 05 00.1	17.793
19	09 26 28.57	2.4896	19 40 01.3	13.540	19	11 20 25.22	2.2735	6 47 11.4	17.830
20	09 28 57.79	2.4846	19 26 24.7	13.679	20	11 22 41.54	2.2704	6 29 20.5	17.867
21	09 31 26.72	2.4795	19 12 39.8	13.816	21	11 24 57.67	2.2673	6 11 27.4	17.900
22	09 33 55.33	2.4744	18 58 46.8	13.951	22	11 27 13.61	2.2642	5 53 32.5	17.931
23	09 36 23.65	2.4693	+18 44 45.7	-14.084	23	11 29 29.37	2.2613	+ 5 35 35.7	-17.961
Tuesday, March 3.					Thursday, March 5.				
00	09 38 51.65	2.4642	+18 30 36.7	-14.214	00	11 31 44.96	2.2584	+ 5 17 37.2	-17.988
01	09 41 19.35	2.4592	18 16 20.0	14.343	01	11 34 00.38	2.2557	4 59 37.2	18.013
02	09 43 46.75	2.4540	18 01 55.6	14.470	02	11 36 15.64	2.2529	4 41 35.7	18.035
03	09 46 13.83	2.4488	17 47 23.6	14.595	03	11 38 30.73	2.2503	4 23 33.0	18.055
04	09 48 40.09	2.4438	17 32 44.2	14.718	04	11 40 45.67	2.2478	4 05 29.1	18.073
05	09 51 07.61	2.4388	17 17 57.4	14.839	05	11 43 00.46	2.2453	3 47 24.2	18.089
06	09 53 33.26	2.4337	17 03 03.5	14.957	06	11 45 15.10	2.2428	3 29 18.4	18.103
07	09 55 59.13	2.4286	16 48 02.6	15.074	07	11 47 29.60	2.2406	3 11 11.8	18.116
08	09 58 24.69	2.4235	16 32 54.6	15.189	08	11 49 43.97	2.2383	2 53 04.5	18.125
09	10 00 49.95	2.4186	16 17 39.9	15.301	09	11 51 58.20	2.2362	2 34 56.8	18.133
10	10 03 14.92	2.4136	16 02 18.5	15.412	10	11 54 12.31	2.2342	2 16 48.6	18.138
11	10 05 39.58	2.4085	15 46 50.5	15.520	11	11 56 26.30	2.2322	1 58 40.2	18.142
12	10 08 03.94	2.4036	15 31 16.1	15.626	12	11 58 40.17	2.2303	1 40 31.6	18.143
13	10 10 28.01	2.3987	15 15 35.4	15.730	13	12 00 53.93	2.2284	1 22 23.0	18.143
14	10 12 51.78	2.3938	14 59 48.5	15.833	14	12 03 07.58	2.2267	1 04 14.5	18.139
15	10 15 15.26	2.3888	14 43 55.5	15.933	15	12 05 21.13	2.2250	0 46 06.3	18.134
16	10 17 38.44	2.3841	14 27 56.6	16.029	16	12 07 34.58	2.2235	0 27 58.4	18.128
17	10 20 01.35	2.3793	14 11 52.0	16.124	17	12 09 47.95	2.2220	+ 0 09 51.0	18.118
18	10 22 23.96	2.3745	13 55 41.7	16.218	18	12 12 01.22	2.2205	- 0 08 15.8	18.108
19	10 24 46.29	2.3698	13 39 25.8	16.309	19	12 14 14.41	2.2193	0 26 21.9	18.094
20	10 27 08.34	2.3652	13 23 04.6	16.398	20	12 16 27.53	2.2180	0 44 27.1	18.079
21	10 29 30.11	2.3606	13 06 38.1	16.485	21	12 18 40.57	2.2168	1 02 31.4	18.062
22	10 31 51.61	2.3560	12 50 06.4	16.570	22	12 20 53.55	2.2158	1 20 34.5	18.043
23	10 34 12.83	2.3514	12 33 29.7	16.652	23	12 23 06.46	2.2148	1 38 36.5	18.022
24	10 36 33.78	2.3470	+12 16 48.2	-16.731	24	12 25 19.32	2.2138	- 1 56 37.1	-17.998

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Friday, March 6.					Sunday, March 8.				
00	12 25 19.32	2.2138	- 1° 56' 37".1	-17.998	00	14 11 58.46	2.2556	-15° 19' 05".0	-14.703
01	12 27 32.12	2.2130	2 14 36.3	17.973	01	14 14 13.86	2.2578	15 33 49.4	14.687
02	12 29 44.88	2.2123	2 32 33.9	17.947	02	14 16 29.40	2.2603	15 48 27.4	14.580
03	12 31 57.59	2.2116	2 50 29.9	17.918	03	14 18 45.09	2.2627	16 02 59.0	14.473
04	12 34 10.27	2.2110	3 08 24.0	17.886	04	14 21 00.92	2.2650	16 17 24.1	14.363
05	12 36 22.91	2.2105	3 26 16.2	17.853	05	14 23 16.89	2.2674	16 31 42.0	14.253
06	12 38 35.53	2.2101	3 44 06.4	17.819	06	14 25 33.01	2.2699	16 45 54.4	14.141
07	12 40 48.12	2.2098	4 01 54.5	17.782	07	14 27 49.28	2.2724	16 59 59.5	14.028
08	12 43 00.70	2.2095	4 19 40.2	17.743	08	14 30 05.70	2.2749	17 13 57.7	13.913
09	12 45 13.26	2.2093	4 37 23.7	17.703	09	14 32 22.27	2.2775	17 27 49.0	13.798
10	12 47 25.81	2.2091	4 55 04.6	17.661	10	14 34 39.00	2.2801	17 41 33.4	13.681
11	12 49 38.35	2.2091	5 12 43.0	17.617	11	14 36 55.88	2.2827	17 55 10.7	13.562
12	12 51 50.90	2.2092	5 30 18.6	17.570	12	14 39 12.92	2.2853	18 08 40.8	13.443
13	12 54 03.45	2.2093	5 47 51.4	17.523	13	14 41 30.12	2.2880	18 22 03.8	13.322
14	12 56 16.01	2.2095	6 05 21.3	17.473	14	14 43 47.48	2.2906	18 35 19.4	13.200
15	12 58 28.59	2.2098	6 22 48.2	17.422	15	14 46 04.99	2.2933	18 48 27.8	13.078
16	13 00 41.18	2.2101	6 40 11.9	17.368	16	14 48 22.67	2.2961	19 01 28.7	12.953
17	13 02 53.80	2.2106	6 57 32.4	17.313	17	14 50 40.52	2.2988	19 14 22.2	12.828
18	13 05 06.45	2.2110	7 14 49.5	17.256	18	14 52 58.52	2.3014	19 27 08.1	12.702
19	13 07 19.12	2.2115	7 32 03.1	17.198	19	14 55 16.69	2.3041	19 39 46.4	12.575
20	13 09 31.83	2.2123	7 49 13.2	17.138	20	14 57 35.01	2.3068	19 52 17.1	12.447
21	13 11 44.59	2.2129	8 06 19.7	17.076	21	14 59 53.51	2.3097	20 04 40.0	12.317
22	13 13 57.38	2.2137	8 23 22.3	17.012	22	15 02 12.17	2.3123	20 16 55.1	12.186
23	13 16 10.23	2.2146	- 8 40 21.1	-16.947	23	15 04 30.99	2.3151	-20 29 02.3	-12.054
Saturday, March 7.					Monday, March 9.				
00	13 18 23.13	2.2155	- 8 57 15.9	-16.879	00	15 06 49.98	2.3178	-20 41 01.6	-11.922
01	13 20 36.09	2.2165	9 14 06.6	16.810	01	15 09 09.13	2.3206	20 52 52.0	11.788
02	13 22 49.11	2.2175	9 30 53.1	16.740	02	15 11 28.45	2.3233	21 04 36.2	11.653
03	13 25 02.19	2.2186	9 47 35.4	16.668	03	15 13 47.93	2.3261	21 16 11.3	11.518
04	13 27 15.34	2.2198	10 04 13.2	16.593	04	15 16 07.58	2.3288	21 27 38.3	11.381
05	13 29 28.57	2.2211	10 20 46.6	16.518	05	15 18 27.38	2.3314	21 38 57.0	11.243
06	13 31 41.87	2.2223	10 37 15.4	16.442	06	15 20 47.35	2.3342	21 50 07.5	11.104
07	13 33 55.25	2.2238	10 53 39.6	16.363	07	15 23 07.48	2.3368	22 01 09.0	10.963
08	13 36 08.72	2.2253	11 09 58.9	16.282	08	15 25 27.77	2.3395	22 12 03.3	10.820
09	13 38 22.28	2.2268	11 26 13.4	16.201	09	15 27 48.22	2.3422	22 22 48.6	10.683
10	13 40 35.93	2.2283	11 42 23.0	16.118	10	15 30 08.83	2.3448	22 33 25.4	10.542
11	13 42 49.67	2.2298	11 58 27.5	16.032	11	15 32 29.59	2.3473	22 43 53.6	10.400
12	13 45 03.51	2.2315	12 14 26.8	15.945	12	15 34 50.51	2.3499	22 54 13.2	10.254
13	13 47 17.45	2.2333	12 30 20.9	15.858	13	15 37 11.58	2.3524	23 04 24.2	10.110
14	13 49 31.50	2.2351	12 46 09.7	15.768	14	15 39 32.80	2.3550	23 14 26.4	9.963
15	13 51 45.66	2.2369	13 01 53.0	15.677	15	15 41 54.18	2.3575	23 24 19.0	9.813
16	13 53 59.93	2.2388	13 17 30.9	15.584	16	15 44 15.70	2.3599	23 34 04.6	9.662
17	13 56 14.31	2.2408	13 33 03.1	15.490	17	15 46 37.37	2.3623	23 43 40.5	9.515
18	13 58 28.82	2.2428	13 48 29.7	15.395	18	15 48 59.18	2.3647	23 53 07.6	9.377
19	14 00 43.44	2.2447	14 03 50.5	15.298	19	15 51 21.13	2.3669	24 02 25.7	9.227
20	14 02 58.18	2.2468	14 19 05.5	15.200	20	15 53 43.21	2.3693	24 11 34.8	9.077
21	14 05 13.06	2.2490	14 34 14.5	15.100	21	15 56 05.44	2.3716	24 20 34.9	8.927
22	14 07 28.06	2.2511	14 49 17.5	14.998	22	15 58 27.80	2.3738	24 29 26.0	8.776
23	14 09 43.19	2.2533	15 04 14.3	14.896	23	16 00 50.29	2.3759	24 38 08.0	8.623
24	14 11 58.46	2.2556	-15 19 05.0	-14.793	24	16 03 12.91	2.3780	-24 46 40.8	-8.471

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Tuesday, March 10.					Thursday, March 12.				
00	^h 16 ^m 03 ^s 12.91	2.3780	—24 46 40.8	—8.471	00	^h 17 ^m 58 ^s 26.86	2.3904	—28 30 56.3	—0.831
01	16 05 35.65	2.3801	24 55 04.5	8.318	01	18 00 50.23	2.3884	28 31 41.4	0.673
02	16 07 58.52	2.3822	25 03 19.0	8.165	02	18 03 13.47	2.3863	28 32 17.1	0.517
03	16 10 21.51	2.3841	25 11 24.3	8.012	03	18 05 36.59	2.3842	28 32 43.4	0.360
04	16 12 44.61	2.3859	25 19 20.4	7.857	04	18 07 59.57	2.3819	28 33 00.3	0.203
05	16 15 07.82	2.3878	25 27 07.1	7.701	05	18 10 22.42	2.3796	28 33 07.8	—0.047
06	16 17 31.14	2.3895	25 34 44.5	7.546	06	18 12 45.12	2.3771	28 33 05.9	+0.108
07	16 19 54.56	2.3912	25 42 12.6	7.390	07	18 15 07.67	2.3746	28 32 54.8	0.263
08	16 22 18.08	2.3928	25 49 31.3	7.233	08	18 17 30.07	2.3719	28 32 34.4	0.418
09	16 24 41.70	2.3944	25 56 40.6	7.077	09	18 19 52.30	2.3692	28 32 04.7	0.572
10	16 27 05.41	2.3959	26 03 40.5	6.919	10	18 22 14.37	2.3664	28 31 25.8	0.725
11	16 29 29.21	2.3974	26 10 30.9	6.761	11	18 24 36.27	2.3635	28 30 37.7	0.878
12	16 31 53.10	2.3988	26 17 11.8	6.603	12	18 26 57.99	2.3605	28 29 40.5	1.030
13	16 34 17.06	2.4000	26 23 43.2	6.444	13	18 29 19.53	2.3574	28 28 34.1	1.182
14	16 36 41.10	2.4013	26 30 05.1	6.285	14	18 31 40.88	2.3542	28 27 18.7	1.333
15	16 39 05.21	2.4024	26 36 17.4	6.126	15	18 34 02.03	2.3509	28 25 54.2	1.483
16	16 41 29.39	2.4035	26 42 20.2	5.967	16	18 36 22.99	2.3477	28 24 20.7	1.633
17	16 43 53.63	2.4044	26 48 13.4	5.807	17	18 38 43.75	2.3442	28 22 38.3	1.782
18	16 46 17.92	2.4053	26 53 57.0	5.647	18	18 41 04.29	2.3407	28 20 46.9	1.931
19	16 48 42.27	2.4062	26 59 31.0	5.486	19	18 43 24.63	2.3372	28 18 46.6	2.078
20	16 51 06.66	2.4069	27 04 55.3	5.326	20	18 45 44.75	2.3335	28 16 37.5	2.225
21	16 53 31.10	2.4076	27 10 10.1	5.166	21	18 48 04.65	2.3298	28 14 19.6	2.372
22	16 55 55.57	2.4082	27 15 15.2	5.004	22	18 50 24.32	2.3259	28 11 52.9	2.518
23	16 58 20.08	2.4087	—27 20 10.6	—4.843	23	18 52 43.76	2.3221	—28 09 17.5	+2.663
Wednesday, March 11.					Friday, March 13.				
00	17 00 44.61	2.4090	—27 24 56.4	—4.683	00	18 55 02.97	2.3182	—28 06 33.4	+2.807
01	17 03 09.16	2.4093	27 29 32.5	4.521	01	18 57 21.94	2.3141	28 03 40.7	2.950
02	17 05 33.73	2.4096	27 33 58.9	4.359	02	18 59 40.66	2.3100	28 00 39.4	3.093
03	17 07 58.31	2.4098	27 38 15.6	4.198	03	19 01 59.14	2.3058	27 57 29.5	3.236
04	17 10 22.90	2.4098	27 42 22.7	4.038	04	19 04 17.36	2.3016	27 54 11.1	3.376
05	17 12 47.48	2.4097	27 46 20.1	3.876	05	19 06 35.33	2.2973	27 50 44.4	3.516
06	17 15 12.06	2.4095	27 50 07.8	3.714	06	19 08 53.04	2.2930	27 47 09.2	3.656
07	17 17 36.62	2.4093	27 53 45.8	3.553	07	19 11 10.49	2.2886	27 43 25.7	3.795
08	17 20 01.17	2.4090	27 57 14.1	3.392	08	19 13 27.67	2.2841	27 39 33.8	3.933
09	17 22 25.70	2.4085	28 00 32.8	3.231	09	19 15 44.58	2.2796	27 35 33.8	4.069
10	17 24 50.19	2.4080	28 03 41.8	3.069	10	19 18 01.22	2.2750	27 31 25.5	4.206
11	17 27 14.66	2.4074	28 06 41.1	2.908	11	19 20 17.58	2.2703	27 27 09.1	4.341
12	17 29 39.08	2.4067	28 09 30.7	2.747	12	19 22 33.66	2.2657	27 22 44.6	4.475
13	17 32 03.46	2.4058	28 12 10.7	2.586	13	19 24 49.46	2.2609	27 18 12.1	4.609
14	17 34 27.78	2.4048	28 14 41.0	2.424	14	19 27 04.97	2.2561	27 13 31.5	4.742
15	17 36 52.04	2.4039	28 17 01.6	2.264	15	19 29 20.19	2.2513	27 08 43.1	4.873
16	17 39 16.25	2.4028	28 19 12.7	2.104	16	19 31 35.12	2.2464	27 03 46.8	5.004
17	17 41 40.38	2.4015	28 21 14.1	1.943	17	19 33 49.76	2.2415	26 58 42.6	5.134
18	17 44 04.43	2.4003	28 23 05.9	1.784	18	19 36 04.10	2.2365	26 53 30.7	5.263
19	17 46 28.41	2.3989	28 24 48.2	1.625	19	19 38 18.14	2.2315	26 48 11.0	5.392
20	17 48 52.30	2.3973	28 26 20.9	1.465	20	19 40 31.88	2.2264	26 42 43.7	5.518
21	17 51 16.09	2.3958	28 27 44.0	1.306	21	19 42 45.31	2.2213	26 37 08.8	5.645
22	17 53 39.79	2.3941	28 28 57.6	1.148	22	19 44 58.44	2.2163	26 31 26.3	5.770
23	17 56 03.38	2.3923	28 30 01.7	0.989	23	19 47 11.27	2.2112	26 25 36.4	5.894
24	17 58 26.86	2.3904	—28 30 56.3	—0.831	24	19 49 23.78	2.2059	—26 19 39.0	+6.018

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Saturday, March 14.					Monday, March 16.				
00	19 49 23.78	2.2059	-26 19 39.0	+ 6.018	00	21 29 08.59	1.9538	-19 27 10.8	+ 1.0700
01	19 51 35.98	2.2008	26 13 34.2	6.140	01	21 31 05.68	1.9491	19 16 21.0	1.0800
02	19 53 47.87	2.1955	26 07 22.2	6.262	02	21 33 02.48	1.9443	19 05 26.8	1.0900
03	19 55 59.44	2.1903	26 01 02.8	6.383	03	21 34 59.00	1.9397	18 54 28.0	1.1000
04	19 58 10.70	2.1850	25 54 36.3	6.502	04	21 36 55.24	1.9350	18 43 24.0	1.1100
05	20 00 21.64	2.1797	25 48 02.6	6.621	05	21 38 51.20	1.9304	18 32 17.4	1.1200
06	20 02 32.26	2.1743	25 41 21.8	6.738	06	21 40 46.89	1.9259	18 21 05.7	1.1300
07	20 04 42.56	2.1691	25 34 34.0	6.855	07	21 42 42.31	1.9213	18 09 49.7	1.1400
08	20 06 52.55	2.1637	25 27 39.2	6.971	08	21 44 37.45	1.9168	17 58 29.5	1.1500
09	20 09 02.20	2.1583	25 20 37.5	7.085	09	21 46 32.33	1.9125	17 47 05.1	1.1600
10	20 11 11.54	2.1529	25 13 29.0	7.199	10	21 48 26.95	1.9081	17 35 36.7	1.1700
11	20 13 20.55	2.1475	25 06 13.6	7.313	11	21 50 21.30	1.9038	17 24 04.3	1.1800
12	20 15 29.24	2.1421	24 58 51.5	7.424	12	21 52 15.40	1.8995	17 12 27.0	1.1900
13	20 17 37.60	2.1367	24 51 22.7	7.534	13	21 54 09.24	1.8953	17 00 47.6	1.2000
14	20 19 45.64	2.1313	24 43 47.4	7.644	14	21 56 02.83	1.8911	16 49 03.5	1.2100
15	20 21 53.35	2.1258	24 36 05.4	7.753	15	21 57 56.17	1.8869	16 37 15.5	1.2200
16	20 24 00.74	2.1204	24 28 17.0	7.861	16	21 59 49.26	1.8828	16 25 23.8	1.2300
17	20 26 07.80	2.1150	24 20 22.1	7.968	17	22 01 42.11	1.8788	16 13 28.4	1.2400
18	20 28 14.54	2.1096	24 12 20.9	8.073	18	22 03 34.71	1.8748	16 01 29.4	1.2500
19	20 30 20.95	2.1042	24 04 13.3	8.179	19	22 05 27.08	1.8708	15 49 26.7	1.2600
20	20 32 27.04	2.0988	23 55 59.4	8.283	20	22 07 19.21	1.8669	15 37 20.6	1.2700
21	20 34 32.80	2.0933	23 47 39.4	8.385	21	22 09 11.11	1.8632	15 25 10.9	1.2800
22	20 36 38.24	2.0879	23 39 13.2	8.487	22	22 11 02.79	1.8593	15 12 57.8	1.2900
23	20 38 43.35	2.0824	-23 30 41.0	+ 8.588	23	22 12 54.23	1.8555	-15 00 41.3	+ 1.3000
Sunday, March 15.					Tuesday, March 17.				
00	20 40 48.13	2.0770	-23 22 02.7	+ 8.688	00	22 14 45.45	1.8518	-14 48 21.5	+ 1.3100
01	20 42 52.59	2.0718	23 13 18.4	8.787	01	22 16 36.45	1.8483	14 35 58.4	1.3200
02	20 44 56.74	2.0664	23 04 28.3	8.884	02	22 18 27.24	1.8447	14 23 32.1	1.3300
03	20 47 00.56	2.0609	22 55 32.3	8.982	03	22 20 17.81	1.8412	14 11 02.6	1.3400
04	20 49 04.05	2.0556	22 46 30.5	9.078	04	22 22 08.18	1.8377	13 58 30.0	1.3500
05	20 51 07.23	2.0503	22 37 23.0	9.172	05	22 23 58.33	1.8342	13 45 54.3	1.3600
06	20 53 10.09	2.0450	22 28 09.9	9.266	06	22 25 48.28	1.8309	13 33 15.6	1.3700
07	20 55 12.63	2.0397	22 18 51.1	9.359	07	22 27 38.04	1.8276	13 20 33.9	1.3800
08	20 57 14.85	2.0344	22 09 26.8	9.451	08	22 29 27.59	1.8243	13 07 49.3	1.3900
09	20 59 16.76	2.0293	21 59 57.0	9.543	09	22 31 16.96	1.8212	12 55 01.7	1.4000
10	21 01 18.36	2.0240	21 50 21.7	9.633	10	22 33 06.13	1.8180	12 42 11.1	1.4100
11	21 03 19.64	2.0188	21 40 41.1	9.721	11	22 34 55.12	1.8150	12 29 18.3	1.4200
12	21 05 20.61	2.0136	21 30 55.2	9.809	12	22 36 43.93	1.8120	12 16 22.4	1.4300
13	21 07 21.27	2.0084	21 21 04.0	9.896	13	22 38 32.56	1.8090	12 03 23.9	1.4400
14	21 09 21.62	2.0033	21 11 07.7	9.983	14	22 40 21.01	1.8061	11 50 22.7	1.4500
15	21 11 21.67	1.9983	21 01 06.1	10.068	15	22 42 09.29	1.8033	11 37 18.9	1.4600
16	21 13 21.41	1.9931	20 50 59.6	10.152	16	22 43 57.40	1.8005	11 24 12.6	1.4700
17	21 15 20.84	1.9881	20 40 47.9	10.236	17	22 45 45.35	1.7978	11 11 03.9	1.4800
18	21 17 19.98	1.9832	20 30 31.3	10.317	18	22 47 33.13	1.7951	10 57 52.6	1.4900
19	21 19 18.82	1.9782	20 20 09.9	10.398	19	22 49 20.76	1.7925	10 44 39.0	1.5000
20	21 21 17.36	1.9732	20 09 43.5	10.479	20	22 51 08.23	1.7900	10 31 23.1	1.5100
21	21 23 15.60	1.9683	19 59 12.4	10.558	21	22 52 55.56	1.7875	10 18 04.9	1.5200
22	21 25 13.56	1.9635	19 48 36.5	10.637	22	22 54 42.73	1.7850	10 04 44.4	1.5300
23	21 27 11.22	1.9586	19 37 56.0	10.714	23	22 56 29.76	1.7827	9 51 21.7	1.5400
24	21 29 08.59	1.9538	-19 27 10.8	+ 10.792	24	22 58 16.65	1.7803	- 9 37 56.9	+ 1.5500

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Wednesday, March 18.					Friday, March 20.				
00	^h 22 ^m 58 ^s 16.65	1.7803	— 9 37 56.9	+13.431	00	^h 00 ^m 22 ^s 16.60	1.7444	+ 1 32 55.7	+14.229
01	23 00 03.40	1.7782	9 24 30.0	13.466	01	00 24 01.29	1.7453	1 47 09.4	14.227
02	23 01 50.03	1.7760	9 11 01.0	13.500	02	00 25 46.04	1.7463	2 01 22.9	14.223
03	23 03 36.52	1.7738	8 57 30.0	13.533	03	00 27 30.84	1.7472	2 15 36.2	14.220
04	23 05 22.88	1.7718	8 43 57.0	13.566	04	00 29 15.70	1.7483	2 29 49.3	14.216
05	23 07 09.13	1.7698	8 30 22.1	13.597	05	00 31 00.63	1.7493	2 44 02.1	14.210
06	23 08 55.26	1.7678	8 16 45.4	13.628	06	00 32 45.62	1.7505	2 58 14.5	14.203
07	23 10 41.27	1.7659	8 03 06.8	13.658	07	00 34 30.69	1.7518	3 12 26.5	14.198
08	23 12 27.17	1.7642	7 49 26.5	13.687	08	00 36 15.84	1.7532	3 26 38.2	14.190
09	23 14 12.97	1.7624	7 35 44.4	13.715	09	00 38 01.07	1.7545	3 40 49.3	14.181
10	23 15 58.66	1.7607	7 22 00.7	13.743	10	00 39 46.38	1.7559	3 54 59.9	14.173
11	23 17 44.25	1.7591	7 08 15.3	13.770	11	00 41 31.78	1.7575	4 09 10.0	14.163
12	23 19 29.75	1.7576	6 54 28.3	13.796	12	00 43 17.28	1.7592	4 23 19.4	14.152
13	23 21 15.16	1.7560	6 40 39.8	13.821	13	00 45 02.88	1.7608	4 37 28.2	14.140
14	23 23 00.47	1.7546	6 26 49.8	13.846	14	00 46 48.57	1.7624	4 51 36.2	14.128
15	23 24 45.71	1.7533	6 12 58.3	13.870	15	00 48 34.37	1.7643	5 05 43.5	14.115
16	23 26 30.86	1.7519	5 59 05.4	13.893	16	00 50 20.28	1.7662	5 19 50.0	14.101
17	23 28 15.94	1.7508	5 45 11.2	13.914	17	00 52 06.31	1.7681	5 33 55.6	14.086
18	23 30 00.95	1.7495	5 31 15.7	13.937	18	00 53 52.45	1.7701	5 48 00.3	14.071
19	23 31 45.88	1.7484	5 17 18.8	13.958	19	00 55 38.72	1.7722	6 02 04.1	14.054
20	23 33 30.76	1.7474	5 03 20.8	13.977	20	00 57 25.11	1.7743	6 16 06.8	14.037
21	23 35 15.57	1.7463	4 49 21.6	13.996	21	00 59 11.63	1.7764	6 30 08.5	14.018
22	23 37 00.32	1.7454	4 35 21.3	14.015	22	01 00 58.28	1.7788	6 44 09.0	13.999
23	23 38 45.02	1.7446	— 4 21 19.8	+14.033	23	01 02 45.08	1.7811	+ 6 58 08.4	+13.980
Thursday, March 19.					Saturday, March 21.				
00	23 40 29.67	1.7438	— 4 07 17.4	+14.049	00	01 04 32.01	1.7834	+ 7 12 06.6	+13.959
01	23 42 14.28	1.7431	3 53 13.9	14.066	01	01 06 19.09	1.7859	7 26 03.5	13.938
02	23 43 58.84	1.7424	3 39 09.5	14.081	02	01 08 06.32	1.7885	7 39 59.1	13.916
03	23 45 43.37	1.7418	3 25 04.2	14.096	03	01 09 53.71	1.7912	7 53 53.4	13.893
04	23 47 27.86	1.7413	3 10 58.0	14.110	04	01 11 41.26	1.7938	8 07 46.2	13.868
05	23 49 12.32	1.7408	2 56 51.0	14.123	05	01 13 28.97	1.7965	8 21 37.6	13.844
06	23 50 56.75	1.7403	2 42 43.2	14.135	06	01 15 16.84	1.7993	8 35 27.5	13.818
07	23 52 41.16	1.7401	2 28 34.8	14.147	07	01 17 04.89	1.8023	8 49 15.8	13.792
08	23 54 25.56	1.7398	2 14 25.6	14.158	08	01 18 53.11	1.8052	9 03 02.5	13.764
09	23 56 09.94	1.7395	2 00 15.8	14.168	09	01 20 41.51	1.8082	9 16 47.5	13.736
10	23 57 54.30	1.7394	1 46 05.4	14.178	10	01 22 30.09	1.8113	9 30 30.8	13.707
11	23 59 38.67	1.7394	1 31 54.5	14.186	11	01 24 18.86	1.8144	9 44 12.3	13.677
12	00 01 23.03	1.7393	1 17 43.1	14.194	12	01 26 07.82	1.8177	9 57 52.0	13.646
13	00 03 07.39	1.7394	1 03 31.2	14.201	13	01 27 56.98	1.8209	10 11 29.8	13.614
14	00 04 51.76	1.7396	0 49 19.0	14.207	14	01 29 46.33	1.8243	10 25 05.7	13.582
15	00 06 36.14	1.7398	0 35 06.4	14.213	15	01 31 35.89	1.8277	10 38 39.6	13.548
16	00 08 20.53	1.7399	0 20 53.4	14.218	16	01 33 25.65	1.8312	10 52 11.5	13.513
17	00 10 04.93	1.7403	— 0 06 40.2	14.222	17	01 35 15.63	1.8348	11 05 41.2	13.478
18	00 11 49.36	1.7407	+ 0 07 33.2	14.225	18	01 37 05.82	1.8383	11 19 08.8	13.442
19	00 13 33.81	1.7412	0 21 46.8	14.228	19	01 38 56.23	1.8420	11 32 34.2	13.404
20	00 15 18.30	1.7417	0 36 00.5	14.229	20	01 40 46.86	1.8458	11 45 57.3	13.366
21	00 17 02.81	1.7423	0 50 14.3	14.230	21	01 42 37.73	1.8497	11 59 18.1	13.328
22	00 18 47.37	1.7429	1 04 28.1	14.230	22	01 44 28.82	1.8534	12 12 36.6	13.288
23	00 20 31.96	1.7436	1 18 41.9	14.230	23	01 46 20.14	1.8574	12 25 52.6	13.246
24	00 22 16.60	1.7444	+ 1 32 55.7	+14.229	24	01 48 11.71	1.8615	+12 39 06.1	+13.204

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Sunday, March 22.					Tuesday, March 24.				
00	01 48 11.71	1.8615	+12 39 06.1	+13.204	00	03 23 18.97	2.1221	+22 05 05.4	+9.954
01	01 50 03.52	1.8655	12 52 17.1	13.161	01	03 25 26.49	2.1286	22 14 59.8	9.858
02	01 51 55.57	1.8697	13 05 25.4	13.117	02	03 27 34.40	2.1352	22 24 48.4	9.761
03	01 53 47.88	1.8739	13 18 31.1	13.073	03	03 29 42.71	2.1418	22 34 31.1	9.662
04	01 55 40.44	1.8782	13 31 34.1	13.027	04	03 31 51.42	2.1484	22 44 07.8	9.562
05	01 57 33.26	1.8825	13 44 34.3	12.980	05	03 34 00.52	2.1550	22 53 38.5	9.461
06	01 59 26.34	1.8869	13 57 31.7	12.933	06	03 36 10.02	2.1617	23 03 03.1	9.359
07	02 01 19.69	1.8914	14 10 26.2	12.884	07	03 38 19.92	2.1683	23 12 21.6	9.256
08	02 03 13.31	1.8959	14 23 17.8	12.834	08	03 40 30.22	2.1750	23 21 33.8	9.150
09	02 05 07.20	1.9005	14 36 06.3	12.783	09	03 42 40.92	2.1817	23 30 39.6	9.043
10	02 07 01.37	1.9052	14 48 51.7	12.731	10	03 44 52.02	2.1883	23 39 39.0	8.937
11	02 08 55.82	1.9098	15 01 34.0	12.678	11	03 47 03.52	2.1950	23 48 32.0	8.828
12	02 10 50.55	1.9146	15 14 13.1	12.625	12	03 49 15.42	2.2018	23 57 18.4	8.718
13	02 12 45.57	1.9195	15 26 49.0	12.570	13	03 51 27.73	2.2085	24 05 58.1	8.606
14	02 14 40.89	1.9244	15 39 21.5	12.513	14	03 53 40.44	2.2152	24 14 31.1	8.494
15	02 16 36.50	1.9293	15 51 50.6	12.458	15	03 55 53.55	2.2219	24 22 57.4	8.380
16	02 18 32.41	1.9343	16 04 16.4	12.400	16	03 58 07.07	2.2288	24 31 16.7	8.264
17	02 20 28.62	1.9394	16 16 38.6	12.340	17	04 00 21.00	2.2354	24 39 29.1	8.148
18	02 22 25.14	1.9446	16 28 57.2	12.280	18	04 02 35.32	2.2421	24 47 34.5	8.030
19	02 24 21.97	1.9498	16 41 12.2	12.219	19	04 04 50.05	2.2488	24 55 32.7	7.911
20	02 26 19.11	1.9550	16 53 23.5	12.157	20	04 07 05.18	2.2555	25 03 23.8	7.791
21	02 28 16.57	1.9603	17 05 31.0	12.093	21	04 09 20.71	2.2623	25 11 07.6	7.669
22	02 30 14.35	1.9657	17 17 34.7	12.029	22	04 11 36.65	2.2689	25 18 44.1	7.547
23	02 32 12.45	1.9711	+17 29 34.5	+11.964	23	04 13 52.98	2.2756	+25 26 13.2	+7.422
Monday, March 23.					Wednesday, March 25.				
00	02 34 10.88	1.9766	+17 41 30.4	+11.898	00	04 16 09.72	2.2823	+25 33 34.7	+7.296
01	02 36 09.64	1.9821	17 53 22.2	11.829	01	04 18 26.85	2.2888	25 40 48.7	7.169
02	02 38 08.73	1.9877	18 05 09.9	11.761	02	04 20 44.38	2.2955	25 47 55.0	7.041
03	02 40 08.16	1.9933	18 16 53.5	11.692	03	04 23 02.31	2.3021	25 54 53.6	6.912
04	02 42 07.93	1.9990	18 28 32.9	11.620	04	04 25 20.63	2.3087	26 01 44.4	6.781
05	02 44 08.04	2.0048	18 40 07.9	11.548	05	04 27 39.35	2.3152	26 08 27.3	6.648
06	02 46 08.50	2.0106	18 51 38.6	11.475	06	04 29 58.45	2.3216	26 15 02.2	6.515
07	02 48 09.31	2.0163	19 03 04.9	11.400	07	04 32 17.94	2.3281	26 21 29.1	6.381
08	02 50 10.46	2.0223	19 14 26.6	11.324	08	04 34 37.82	2.3345	26 27 47.9	6.245
09	02 52 11.98	2.0283	19 25 43.8	11.248	09	04 36 58.08	2.3408	26 33 58.5	6.108
10	02 54 13.85	2.0342	19 36 56.4	11.170	10	04 39 18.72	2.3472	26 40 00.9	5.970
11	02 56 16.08	2.0402	19 48 04.2	11.091	11	04 41 39.74	2.3535	26 45 54.9	5.830
12	02 58 18.67	2.0463	19 59 07.3	11.011	12	04 44 01.14	2.3598	26 51 40.5	5.689
13	03 00 21.63	2.0523	20 10 05.5	10.929	13	04 46 22.91	2.3659	26 57 17.6	5.548
14	03 02 24.95	2.0585	20 20 58.8	10.848	14	04 48 45.05	2.3721	27 02 46.2	5.404
15	03 04 28.65	2.0648	20 31 47.2	10.763	15	04 51 07.56	2.3782	27 08 06.1	5.259
16	03 06 32.72	2.0710	20 42 30.4	10.678	16	04 53 30.43	2.3842	27 13 17.3	5.114
17	03 08 37.17	2.0773	20 53 08.5	10.592	17	04 55 53.66	2.3901	27 18 19.8	4.968
18	03 10 41.99	2.0835	21 03 41.4	10.504	18	04 58 17.24	2.3960	27 23 13.4	4.818
19	03 12 47.19	2.0899	21 14 09.0	10.416	19	05 00 41.18	2.4018	27 27 58.0	4.669
20	03 14 52.78	2.0963	21 24 31.3	10.327	20	05 03 05.46	2.4075	27 32 33.7	4.519
21	03 16 58.74	2.1027	21 34 48.2	10.235	21	05 05 30.08	2.4133	27 37 00.3	4.368
22	03 19 05.10	2.1092	21 44 59.5	10.143	22	05 07 55.05	2.4189	27 41 17.8	4.216
23	03 21 11.84	2.1156	21 55 05.3	10.049	23	05 10 20.35	2.4244	27 45 26.2	4.062
24	03 23 18.97	2.1221	+22 05 05.4	+9.954	24	05 12 45.98	2.4299	+27 49 25.2	+3.906

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Thursday, March 26.					Saturday, March 28.				
00	h m s s		° ' "	+ "	00	h m s s		° ' "	- "
01	05 12 45.98	2.4299	+27 49 25.2	+ 3.906	01	07 13 41.82	2.5617	+27 41 55.9	- 4.438
02	05 15 11.94	2.4353	27 53 14.9	3.750	02	07 16 15.51	2.5613	27 37 24.2	4.620
03	05 17 38.22	2.4407	27 56 55.2	3.593	03	07 18 49.17	2.5608	27 32 41.5	4.803
04	05 20 04.83	2.4459	28 00 26.1	3.435	04	07 21 22.80	2.5601	27 27 47.9	4.984
05	05 22 31.73	2.4509	28 03 47.4	3.276	05	07 23 56.38	2.5593	27 22 43.4	5.166
06	05 24 58.94	2.4559	28 06 59.2	3.116	06	07 26 29.91	2.5584	27 17 28.0	5.348
07	05 27 26.44	2.4608	28 10 01.3	2.954	07	07 29 03.39	2.5574	27 12 01.7	5.528
08	05 29 54.24	2.4657	28 12 53.7	2.792	08	07 31 36.80	2.5563	27 06 24.6	5.709
09	05 32 22.33	2.4704	28 15 36.3	2.629	09	07 34 10.15	2.5551	27 00 36.6	5.889
10	05 34 50.69	2.4750	28 18 09.2	2.465	10	07 36 43.41	2.5536	26 54 37.9	6.068
11	05 37 19.33	2.4795	28 20 32.1	2.299	11	07 39 16.58	2.5522	26 48 28.4	6.248
12	05 39 48.23	2.4839	28 22 45.1	2.133	12	07 41 49.67	2.5506	26 42 08.1	6.428
13	05 42 17.40	2.4883	28 24 48.1	1.967	13	07 44 22.65	2.5488	26 35 37.1	6.606
14	05 44 46.83	2.4927	28 26 41.1	1.799	14	07 46 55.53	2.5470	26 28 55.4	6.784
15	05 47 16.52	2.4968	28 28 24.0	1.630	15	07 49 28.29	2.5451	26 22 03.0	6.962
16	05 49 46.45	2.5008	28 29 56.7	1.460	16	07 52 00.94	2.5431	26 15 00.0	7.138
17	05 52 16.61	2.5047	28 31 19.2	1.289	17	07 54 33.46	2.5409	26 07 46.4	7.315
18	05 54 47.01	2.5084	28 32 31.4	1.118	18	07 57 05.85	2.5387	26 00 22.2	7.491
19	05 57 17.62	2.5120	28 33 33.4	0.947	19	07 59 38.10	2.5363	25 52 47.5	7.666
20	05 59 48.45	2.5156	28 34 25.0	0.773	20	08 02 10.21	2.5339	25 45 02.3	7.840
21	06 02 19.49	2.5190	28 35 06.2	0.600	21	08 04 42.17	2.5313	25 37 06.7	8.013
22	06 04 50.73	2.5223	28 35 37.0	0.427	22	08 07 13.97	2.5288	25 29 00.7	8.187
23	06 07 22.16	2.5254	28 35 57.4	0.252	23	08 09 45.62	2.5261	25 20 44.3	8.358
24	06 09 53.78	2.5285	+28 36 07.2	+ 0.076	24	08 12 17.10	2.5233	+25 12 17.7	- 8.530
Friday, March 27.					Sunday, March 29.				
00	h m s s		° ' "	- "	00	h m s s		° ' "	- "
01	06 12 25.58	2.5314	+28 36 06.5	- 0.100	01	08 14 48.41	2.5204	+25 03 40.7	- 8.701
02	06 14 57.55	2.5343	28 35 55.2	0.277	02	08 17 19.55	2.5174	24 54 53.6	8.870
03	06 17 29.69	2.5368	28 35 33.3	0.454	03	08 19 50.50	2.5143	24 45 56.3	9.039
04	06 20 01.97	2.5393	28 35 00.7	0.632	04	08 22 21.26	2.5112	24 36 48.9	9.208
05	06 22 34.41	2.5418	28 34 17.5	0.810	05	08 24 51.84	2.5080	24 27 31.4	9.374
06	06 25 06.98	2.5440	28 33 23.5	0.989	06	08 27 22.22	2.5048	24 18 04.0	9.539
07	06 27 39.69	2.5462	28 32 18.8	1.168	07	08 29 52.41	2.5014	24 08 26.7	9.704
08	06 30 12.52	2.5482	28 31 03.3	1.348	08	08 32 22.39	2.4980	23 58 39.5	9.868
09	06 32 45.47	2.5500	28 29 37.1	1.528	09	08 34 52.17	2.4946	23 48 42.5	10.031
10	06 35 18.52	2.5517	28 28 00.0	1.708	10	08 37 21.74	2.4910	23 38 35.8	10.193
11	06 37 51.67	2.5533	28 26 12.1	1.888	11	08 39 51.09	2.4874	23 28 19.4	10.353
12	06 40 24.92	2.5548	28 24 13.4	2.070	12	08 42 20.23	2.4838	23 17 53.4	10.513
13	06 42 58.25	2.5562	28 22 03.7	2.252	13	08 44 49.15	2.4802	23 07 17.8	10.672
14	06 45 31.66	2.5573	28 19 43.2	2.433	14	08 47 17.85	2.4764	22 56 32.8	10.838
15	06 48 05.13	2.5584	28 17 11.7	2.615	15	08 49 46.32	2.4727	22 45 38.4	10.994
16	06 50 38.67	2.5593	28 14 29.4	2.797	16	08 52 14.57	2.4688	22 34 34.7	11.139
17	06 53 12.25	2.5601	28 11 36.1	2.980	17	08 54 42.58	2.4649	22 23 21.7	11.293
18	06 55 45.88	2.5608	28 08 31.8	3.162	18	08 57 10.36	2.4611	22 11 59.6	11.444
19	06 58 19.54	2.5613	28 05 16.7	3.343	19	08 59 37.91	2.4572	22 00 28.4	11.596
20	07 00 53.23	2.5617	28 01 50.6	3.526	20	09 02 05.22	2.4532	21 48 48.1	11.746
21	07 03 26.94	2.5619	27 58 13.5	3.708	21	09 04 32.29	2.4492	21 36 58.9	11.893
22	07 06 00.66	2.5621	27 54 25.6	3.891	22	09 06 59.12	2.4452	21 25 00.9	12.040
23	07 08 34.39	2.5621	27 50 26.6	4.074	23	09 09 25.71	2.4411	21 12 54.1	12.186
24	07 11 08.11	2.5619	27 46 16.7	4.256	24	09 11 52.05	2.4370	21 00 38.6	12.331
	07 13 41.82	2.5617	+27 41 55.9	- 4.438		09 14 18.15	2.4329	+20 48 14.4	-12.473

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Monday, March 30.					Wednesday, April 1.				
00	h m s 09 14 18.15	2.4329	+20 48 14.4	-12.473	00	h m s 11 06 35.08	2.2593	+ 8 35 50.5	-17.358
01	09 16 44.00	2.4288	20 35 41.8	12.614	01	11 08 50.56	2.2568	8 18 27.3	17.415
02	09 19 09.61	2.4248	20 23 00.7	12.755	02	11 11 05.90	2.2545	8 01 00.7	17.470
03	09 21 34.97	2.4206	20 10 11.2	12.893	03	11 13 21.10	2.2523	7 43 30.9	17.522
04	09 24 00.08	2.4164	19 57 13.5	13.029	04	11 15 36.17	2.2500	7 25 58.1	17.572
05	09 26 24.94	2.4123	19 44 07.7	13.165	05	11 17 51.10	2.2478	7 08 22.3	17.620
06	09 28 49.55	2.4082	19 30 53.7	13.299	06	11 20 05.91	2.2458	6 50 43.7	17.666
07	09 31 13.92	2.4041	19 17 31.8	13.431	07	11 22 20.60	2.2438	6 33 02.4	17.709
08	09 33 38.04	2.3998	19 04 02.0	13.562	08	11 24 35.17	2.2419	6 15 18.6	17.751
09	09 36 01.90	2.3957	18 50 24.4	13.691	09	11 26 49.63	2.2401	5 57 32.3	17.792
10	09 38 25.52	2.3917	18 36 39.1	13.819	10	11 29 03.98	2.2383	5 39 43.6	17.829
11	09 40 48.90	2.3875	18 22 46.1	13.945	11	11 31 18.23	2.2367	5 21 52.8	17.864
12	09 43 12.02	2.3833	18 08 45.7	14.068	12	11 33 32.38	2.2351	5 03 59.9	17.898
13	09 45 34.90	2.3793	17 54 37.9	14.192	13	11 35 46.44	2.2336	4 46 05.0	17.930
14	09 47 57.53	2.3752	17 40 22.7	14.313	14	11 38 00.41	2.2321	4 28 08.3	17.960
15	09 50 19.92	2.3711	17 26 00.3	14.433	15	11 40 14.29	2.2307	4 10 09.8	17.988
16	09 52 42.06	2.3671	17 11 30.8	14.550	16	11 42 28.09	2.2294	3 52 09.7	18.014
17	09 55 03.97	2.3631	16 56 54.3	14.667	17	11 44 41.82	2.2283	3 34 08.1	18.038
18	09 57 25.63	2.3590	16 42 10.8	14.781	18	11 46 55.48	2.2271	3 16 05.2	18.058
19	09 59 47.05	2.3551	16 27 20.6	14.893	19	11 49 09.07	2.2261	2 58 01.1	18.078
20	10 02 08.24	2.3512	16 12 23.7	15.004	20	11 51 22.61	2.2251	2 39 55.8	18.096
21	10 04 29.19	2.3473	15 57 20.1	15.113	21	11 53 36.08	2.2242	2 21 49.6	18.111
22	10 06 49.91	2.3433	15 42 10.1	15.220	22	11 55 49.51	2.2234	2 03 42.5	18.124
23	10 09 10.39	2.3394	+15 26 53.7	-15.326	23	11 58 02.89	2.2226	+ 1 45 34.7	-18.135
Tuesday, March 31.					Thursday, April 2.				
00	10 11 30.64	2.3357	+15 11 31.0	-15.429	00	12 00 16.22	2.2219	+ 1 27 26.3	-18.144
01	10 13 50.67	2.3319	14 56 02.2	15.532	01	12 02 29.52	2.2214	1 09 17.4	18.152
02	10 16 10.47	2.3282	14 40 27.2	15.632	02	12 04 42.79	2.2209	0 51 08.1	18.157
03	10 18 30.05	2.3245	14 24 46.3	15.730	03	12 06 56.03	2.2205	0 32 58.6	18.159
04	10 20 49.41	2.3208	14 08 59.6	15.827	04	12 09 09.25	2.2202	+ 0 14 49.0	18.161
05	10 23 08.55	2.3173	13 53 07.1	15.922	05	12 11 22.45	2.2199	- 0 03 20.7	18.160
06	10 25 27.48	2.3137	13 37 09.0	16.015	06	12 13 35.64	2.2198	0 21 30.2	18.156
07	10 27 46.19	2.3102	13 21 05.3	16.106	07	12 15 48.82	2.2197	0 39 39.4	18.151
08	10 30 04.70	2.3068	13 04 56.3	16.194	08	12 18 02.00	2.2197	0 57 48.3	18.144
09	10 32 23.00	2.3033	12 48 42.0	16.282	09	12 20 15.18	2.2197	1 15 56.7	18.134
10	10 34 41.10	2.2999	12 32 22.5	16.368	10	12 22 28.36	2.2198	1 34 04.4	18.123
11	10 36 58.99	2.2966	12 15 57.9	16.451	11	12 24 41.56	2.2201	1 52 11.4	18.109
12	10 39 16.69	2.2934	11 59 28.4	16.532	12	12 26 54.77	2.2204	2 10 17.5	18.093
13	10 41 34.20	2.2903	11 42 54.1	16.612	13	12 29 08.01	2.2208	2 28 22.6	18.076
14	10 43 51.52	2.2871	11 26 15.0	16.689	14	12 31 21.27	2.2213	2 46 26.6	18.057
15	10 46 08.65	2.2840	11 09 31.4	16.765	15	12 33 34.56	2.2218	3 04 29.4	18.035
16	10 48 25.60	2.2810	10 52 43.2	16.839	16	12 35 47.88	2.2224	3 22 30.8	18.011
17	10 50 42.37	2.2781	10 35 50.7	16.911	17	12 38 01.25	2.2232	3 40 30.7	17.985
18	10 52 58.97	2.2752	10 18 53.9	16.981	18	12 40 14.66	2.2239	3 58 29.0	17.958
19	10 55 15.39	2.2723	10 01 53.0	17.049	19	12 42 28.12	2.2248	4 16 25.6	17.928
20	10 57 31.65	2.2696	9 44 48.0	17.115	20	12 44 41.63	2.2257	4 34 20.3	17.896
21	10 59 47.74	2.2669	9 27 39.2	17.178	21	12 46 55.20	2.2268	4 52 13.1	17.862
22	11 02 03.68	2.2643	9 10 26.6	17.241	22	12 49 08.84	2.2278	5 10 03.7	17.826
23	11 04 19.45	2.2617	8 53 10.3	17.301	23	12 51 22.54	2.2289	5 27 52.2	17.788
24	11 06 35.08	2.2593	+ 8 35 50.5	-17.358	24	12 53 36.31	2.2302	- 5 45 38.3	-17.748

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Friday, April 3.					Sunday, April 5.				
00	12 53 36.31	2.2302	- 5 45 38.3	-17.748	00	14 43 15.05	2.3562	-18 35 17.0	-13.633
01	12 55 50.16	2.2315	6 03 22.0	17.707	01	14 45 36.52	2.3596	18 48 51.2	13.506
02	12 58 04.09	2.2328	6 21 03.1	17.663	02	14 47 58.20	2.3631	19 02 17.7	13.377
03	13 00 18.10	2.2343	6 38 41.5	17.617	03	14 50 20.09	2.3665	19 15 36.4	13.247
04	13 02 32.20	2.2358	6 56 17.1	17.568	04	14 52 42.18	2.3699	19 28 47.3	13.116
05	13 04 46.40	2.2375	7 13 49.7	17.518	05	14 55 04.48	2.3733	19 41 50.3	12.983
06	13 07 00.70	2.2391	7 31 19.3	17.467	06	14 57 26.98	2.3768	19 54 45.2	12.848
07	13 09 15.09	2.2408	7 48 45.8	17.414	07	14 59 49.69	2.3802	20 07 32.1	12.714
08	13 11 29.59	2.2426	8 06 09.0	17.358	08	15 02 12.60	2.3835	20 20 10.9	12.577
09	13 13 44.20	2.2445	8 23 28.7	17.300	09	15 04 35.71	2.3869	20 32 41.4	12.438
10	13 15 58.93	2.2464	8 40 45.0	17.241	10	15 06 59.03	2.3903	20 45 03.5	12.299
11	13 18 13.77	2.2483	8 57 57.6	17.178	11	15 09 22.54	2.3936	20 57 17.3	12.159
12	13 20 28.73	2.2504	9 15 06.4	17.115	12	15 11 46.26	2.3969	21 09 22.6	12.017
13	13 22 43.82	2.2526	9 32 11.4	17.050	13	15 14 10.17	2.4002	21 21 19.3	11.873
14	13 24 59.04	2.2548	9 49 12.4	16.983	14	15 16 34.28	2.4035	21 33 07.4	11.729
15	13 27 14.39	2.2570	10 06 09.3	16.913	15	15 18 58.59	2.4068	21 44 46.8	11.584
16	13 29 29.88	2.2593	10 23 02.0	16.842	16	15 21 23.09	2.4099	21 56 17.5	11.438
17	13 31 45.51	2.2617	10 39 50.4	16.769	17	15 23 47.78	2.4131	22 07 39.3	11.289
18	13 34 01.28	2.2641	10 56 34.3	16.694	18	15 26 12.66	2.4163	22 18 52.2	11.141
19	13 36 17.20	2.2666	11 13 13.7	16.618	19	15 28 37.73	2.4193	22 29 56.2	10.991
20	13 38 33.27	2.2691	11 29 48.4	16.539	20	15 31 02.98	2.4224	22 40 51.1	10.839
21	13 40 49.49	2.2717	11 46 18.4	16.459	21	15 33 28.42	2.4254	22 51 36.9	10.688
22	13 43 05.87	2.2743	12 02 43.5	16.377	22	15 35 54.03	2.4283	23 02 13.6	10.534
23	13 45 22.41	2.2771	-12 19 03.6	-16.293	23	15 38 19.82	2.4313	-23 12 41.0	-10.380
Saturday, April 4.					Monday, April 6.				
00	13 47 39.12	2.2798	-12 35 18.6	-16.207	00	15 40 45.79	2.4343	-23 22 59.2	-10.225
01	13 49 55.99	2.2825	12 51 28.4	16.119	01	15 43 11.93	2.4370	23 33 08.0	10.069
02	13 52 13.02	2.2853	13 07 32.9	16.029	02	15 45 38.23	2.4398	23 43 07.5	9.913
03	13 54 30.23	2.2883	13 23 31.9	15.938	03	15 48 04.70	2.4425	23 52 57.5	9.754
04	13 56 47.62	2.2913	13 39 25.4	15.845	04	15 50 31.33	2.4452	24 02 38.0	9.595
05	13 59 05.18	2.2942	13 55 13.3	15.750	05	15 52 58.12	2.4478	24 12 08.9	9.435
06	14 01 22.92	2.2972	14 10 55.4	15.653	06	15 55 25.06	2.4503	24 21 30.2	9.275
07	14 03 40.84	2.3002	14 26 31.7	15.556	07	15 57 52.15	2.4527	24 30 41.9	9.114
08	14 05 58.94	2.3033	14 42 02.1	15.456	08	16 00 19.38	2.4551	24 39 43.9	8.952
09	14 08 17.23	2.3064	14 57 26.4	15.353	09	16 02 46.76	2.4574	24 48 36.1	8.789
10	14 10 35.71	2.3096	15 12 44.5	15.250	10	16 05 14.27	2.4597	24 57 18.6	8.626
11	14 12 54.38	2.3128	15 27 56.4	15.145	11	16 07 41.92	2.4618	25 05 51.2	8.461
12	14 15 13.24	2.3159	15 43 01.9	15.038	12	16 10 09.69	2.4639	25 14 13.9	8.296
13	14 17 32.29	2.3192	15 58 01.0	14.930	13	16 12 37.59	2.4659	25 22 26.7	8.131
14	14 19 51.54	2.3225	16 12 53.5	14.819	14	16 15 05.60	2.4678	25 30 29.6	7.965
15	14 22 10.99	2.3258	16 27 39.3	14.708	15	16 17 33.73	2.4697	25 38 22.5	7.798
16	14 24 30.63	2.3291	16 42 18.4	14.595	16	16 20 01.96	2.4714	25 46 05.3	7.630
17	14 26 50.48	2.3324	16 56 50.7	14.480	17	16 22 30.30	2.4732	25 53 38.1	7.463
18	14 29 10.52	2.3358	17 11 16.0	14.363	18	16 24 58.74	2.4747	26 01 00.8	7.294
19	14 31 30.77	2.3392	17 25 34.3	14.246	19	16 27 27.26	2.4762	26 08 13.4	7.125
20	14 33 51.22	2.3425	17 39 45.5	14.126	20	16 29 55.88	2.4776	26 15 15.8	6.956
21	14 36 11.87	2.3458	17 53 49.4	14.004	21	16 32 24.57	2.4788	26 22 08.1	6.787
22	14 38 32.72	2.3493	18 07 46.0	13.882	22	16 34 53.33	2.4800	26 28 50.2	6.617
23	14 40 53.78	2.3528	18 21 35.3	13.758	23	16 37 22.17	2.4812	26 35 22.1	6.446
24	14 43 15.05	2.3562	-18 35 17.0	-13.633	24	16 39 51.07	2.4822	-26 41 43.7	-6.275

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Tuesday, April 7.					Thursday, April 9.				
00	16 39 51.07	2.4822	-26 41 43.7	-6.275	00	18 38 02.30	2.3995	-28 26 20.6	+1.789
01	16 42 20.03	2.4830	26 47 55.1	6.104	01	18 40 26.14	2.3952	28 24 28.6	1.944
02	16 44 49.03	2.4838	26 53 56.2	5.933	02	18 42 49.72	2.3908	28 22 27.3	2.098
03	16 47 18.09	2.4846	26 59 47.0	5.761	03	18 45 13.03	2.3863	28 20 16.8	2.253
04	16 49 47.18	2.4850	27 05 27.5	5.588	04	18 47 36.07	2.3817	28 17 57.0	2.405
05	16 52 16.29	2.4855	27 10 57.6	5.417	05	18 49 58.83	2.3770	28 15 28.2	2.556
06	16 54 45.44	2.4859	27 16 17.5	5.245	06	18 52 21.31	2.3723	28 12 50.3	2.707
07	16 57 14.60	2.4862	27 21 27.0	5.073	07	18 54 43.50	2.3675	28 10 03.4	2.857
08	16 59 43.78	2.4863	27 26 26.2	4.900	08	18 57 05.41	2.3627	28 07 07.5	3.006
09	17 02 12.96	2.4863	27 31 15.0	4.728	09	18 59 27.02	2.3577	28 04 02.7	3.153
10	17 04 42.14	2.4863	27 35 53.5	4.555	10	19 01 48.33	2.3526	28 00 49.1	3.300
11	17 07 11.31	2.4861	27 40 21.6	4.382	11	19 04 09.33	2.3475	27 57 26.7	3.447
12	17 09 40.47	2.4858	27 44 39.3	4.209	12	19 06 30.03	2.3424	27 53 55.5	3.593
13	17 12 09.61	2.4854	27 48 46.7	4.037	13	19 08 50.42	2.3372	27 50 15.6	3.736
14	17 14 38.72	2.4848	27 52 43.7	3.864	14	19 11 10.49	2.3318	27 46 27.2	3.878
15	17 17 07.79	2.4842	27 56 30.4	3.692	15	19 13 30.24	2.3265	27 42 30.2	4.021
16	17 19 36.82	2.4834	28 00 06.7	3.518	16	19 15 49.67	2.3212	27 38 24.7	4.162
17	17 22 05.80	2.4825	28 03 32.6	3.347	17	19 18 08.78	2.3157	27 34 10.8	4.302
18	17 24 34.72	2.4815	28 06 48.3	3.175	18	19 20 27.55	2.3102	27 29 48.5	4.440
19	17 27 03.58	2.4805	28 09 53.6	3.003	19	19 22 46.00	2.3047	27 25 18.0	4.578
20	17 29 32.38	2.4793	28 12 48.6	2.832	20	19 25 04.11	2.2990	27 20 39.2	4.715
21	17 32 01.09	2.4778	28 15 33.4	2.660	21	19 27 21.88	2.2934	27 15 52.2	4.852
22	17 34 29.72	2.4764	28 18 07.8	2.488	22	19 29 39.32	2.2878	27 10 57.0	4.986
23	17 36 58.26	2.4748	-28 20 32.0	-2.318	23	19 31 56.41	2.2819	-27 05 53.9	+5.119
Wednesday, April 8.					Friday, April 10.				
00	17 39 26.70	2.4732	-28 22 45.9	-2.147	00	19 34 13.15	2.2762	-27 00 42.7	+5.252
01	17 41 55.04	2.4713	28 24 49.6	1.977	01	19 36 29.55	2.2704	26 55 23.6	5.383
02	17 44 23.26	2.4694	28 26 43.1	1.807	02	19 38 45.60	2.2645	26 49 56.7	5.514
03	17 46 51.37	2.4674	28 28 26.4	1.637	03	19 41 01.29	2.2586	26 44 21.9	5.643
04	17 49 19.35	2.4652	28 29 59.5	1.468	04	19 43 16.63	2.2528	26 38 39.5	5.771
05	17 51 47.19	2.4629	28 31 22.6	1.300	05	19 45 31.62	2.2468	26 32 49.4	5.899
06	17 54 14.90	2.4606	28 32 35.5	1.132	06	19 47 46.25	2.2408	26 26 51.6	6.025
07	17 56 42.46	2.4580	28 33 38.4	0.964	07	19 50 00.52	2.2348	26 20 46.4	6.149
08	17 59 09.86	2.4554	28 34 31.2	0.798	08	19 52 14.43	2.2288	26 14 33.7	6.273
09	18 01 37.11	2.4528	28 35 14.1	0.631	09	19 54 27.98	2.2228	26 08 13.6	6.396
10	18 04 04.19	2.4499	28 35 46.9	0.464	10	19 56 41.17	2.2168	26 01 46.2	6.518
11	18 06 31.10	2.4470	28 36 09.8	0.299	11	19 58 53.99	2.2107	25 55 11.5	6.638
12	18 08 57.83	2.4439	28 36 22.8	-0.134	12	20 01 06.45	2.2046	25 48 29.6	6.758
13	18 11 24.37	2.4408	28 36 25.9	+0.030	13	20 03 18.54	2.1985	25 41 40.6	6.876
14	18 13 50.72	2.4375	28 36 19.2	0.193	14	20 05 30.27	2.1924	25 34 44.5	6.993
15	18 16 16.87	2.4342	28 36 02.7	0.357	15	20 07 41.63	2.1863	25 27 41.4	7.109
16	18 18 42.82	2.4307	28 35 36.4	0.518	16	20 09 52.62	2.1802	25 20 31.4	7.224
17	18 21 08.55	2.4271	28 35 00.5	0.679	17	20 12 03.25	2.1741	25 13 14.5	7.338
18	18 23 34.07	2.4235	28 34 14.9	0.840	18	20 14 13.51	2.1679	25 05 50.8	7.451
19	18 25 59.37	2.4197	28 33 19.7	1.000	19	20 16 23.40	2.1618	24 58 20.4	7.563
20	18 28 24.43	2.4158	28 32 14.9	1.160	20	20 18 32.93	2.1558	24 50 43.3	7.673
21	18 30 49.27	2.4119	28 31 00.5	1.319	21	20 20 42.09	2.1496	24 42 59.6	7.783
22	18 33 13.86	2.4078	28 29 36.6	1.477	22	20 22 50.88	2.1435	24 35 09.4	7.891
23	18 35 38.20	2.4037	28 28 03.3	1.633	23	20 24 59.31	2.1374	24 27 12.7	7.998
24	18 38 02.30	2.3995	-28 26 20.6	+1.789	24	20 27 07.37	2.1313	-24 19 09.6	+8.104

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Saturday, April 11.					Monday, April 13.				
00	^h 20 ^m 27 ^s 07.37	2.1313	—24 19 09.6	+8.104	00	^h 22 ^m 02 ^s 55.21	1.8760	—16 07 27.7	+12.008
01	20 29 15.07	2.1253	24 11 00.2	8.210	01	22 04 47.65	1.8718	15 55 25.4	12.067
02	20 31 22.40	2.1192	24 02 44.4	8.314	02	22 06 39.83	1.8678	15 43 19.7	12.124
03	20 33 29.37	2.1131	23 54 22.5	8.416	03	22 08 31.78	1.8638	15 31 10.5	12.182
04	20 35 35.97	2.1070	23 45 54.5	8.518	04	22 10 23.48	1.8598	15 18 57.9	12.238
05	20 37 42.21	2.1010	23 37 20.3	8.620	05	22 12 14.95	1.8559	15 06 42.0	12.293
06	20 39 48.09	2.0951	23 28 40.1	8.719	06	22 14 06.19	1.8521	14 54 22.8	12.348
07	20 41 53.62	2.0891	23 19 54.0	8.818	07	22 15 57.20	1.8483	14 42 00.3	12.401
08	20 43 58.78	2.0831	23 11 02.0	8.916	08	22 17 47.98	1.8445	14 29 34.7	12.453
09	20 46 03.59	2.0772	23 02 04.1	9.013	09	22 19 38.54	1.8409	14 17 05.9	12.506
10	20 48 08.04	2.0713	22 53 00.5	9.108	10	22 21 28.89	1.8373	14 04 34.0	12.557
11	20 50 12.14	2.0653	22 43 51.2	9.202	11	22 23 19.02	1.8338	13 51 59.1	12.607
12	20 52 15.88	2.0594	22 34 36.3	9.295	12	22 25 08.94	1.8303	13 39 21.2	12.657
13	20 54 19.27	2.0537	22 25 15.8	9.388	13	22 26 58.66	1.8269	13 26 40.3	12.705
14	20 56 22.32	2.0479	22 15 49.7	9.479	14	22 28 48.17	1.8235	13 13 56.6	12.753
15	20 58 25.02	2.0421	22 06 18.3	9.569	15	22 30 37.48	1.8201	13 01 10.0	12.800
16	21 00 27.37	2.0363	21 56 41.4	9.659	16	22 32 26.60	1.8171	12 48 20.6	12.847
17	21 02 29.38	2.0307	21 46 50.2	9.748	17	22 34 15.53	1.8140	12 35 28.4	12.893
18	21 04 31.05	2.0250	21 37 11.7	9.835	18	22 36 04.28	1.8109	12 22 33.5	12.938
19	21 06 32.38	2.0193	21 27 19.0	9.921	19	22 37 52.84	1.8078	12 09 35.9	12.982
20	21 08 33.37	2.0138	21 17 21.2	10.006	20	22 39 41.22	1.8049	11 56 35.7	13.025
21	21 10 34.03	2.0083	21 07 18.3	10.091	21	22 41 29.43	1.8020	11 43 32.9	13.068
22	21 12 34.36	2.0027	20 57 10.3	10.174	22	22 43 17.46	1.7992	11 30 27.6	13.109
23	21 14 34.35	1.9972	—20 46 57.4	+10.256	23	22 45 05.33	1.7964	—11 17 19.8	+13.150
Sunday, April 12.					Tuesday, April 14.				
00	21 16 34.02	1.9918	—20 36 39.6	+10.338	00	22 46 53.03	1.7938	—11 04 09.6	+13.190
01	21 18 33.37	1.9864	20 26 16.9	10.418	01	22 48 40.58	1.7911	10 50 57.0	13.230
02	21 20 32.39	1.9810	20 15 49.5	10.497	02	22 50 27.96	1.7885	10 37 42.0	13.269
03	21 22 31.09	1.9758	20 05 17.3	10.575	03	22 52 15.20	1.7861	10 24 24.7	13.307
04	21 24 29.48	1.9705	19 54 40.5	10.653	04	22 54 02.29	1.7837	10 11 05.2	13.343
05	21 26 27.55	1.9653	19 43 59.0	10.729	05	22 55 49.24	1.7813	9 57 43.5	13.380
06	21 28 25.31	1.9601	19 33 13.0	10.805	06	22 57 36.04	1.7789	9 44 19.6	13.416
07	21 30 22.76	1.9550	19 22 22.4	10.880	07	22 59 22.71	1.7768	9 30 53.6	13.451
08	21 32 19.91	1.9499	19 11 27.4	10.953	08	23 01 09.25	1.7747	9 17 25.5	13.485
09	21 34 16.75	1.9449	19 00 28.1	11.025	09	23 02 55.67	1.7726	9 03 55.4	13.518
10	21 36 13.30	1.9400	18 49 24.4	11.098	10	23 04 41.96	1.7705	8 50 23.3	13.552
11	21 38 09.55	1.9350	18 38 16.4	11.168	11	23 06 28.13	1.7685	8 36 49.2	13.584
12	21 40 05.50	1.9301	18 27 04.2	11.238	12	23 08 14.18	1.7666	8 23 13.2	13.616
13	21 42 01.16	1.9253	18 15 47.8	11.308	13	23 10 00.12	1.7648	8 09 35.3	13.646
14	21 43 56.54	1.9206	18 04 27.3	11.375	14	23 11 45.96	1.7631	7 55 55.7	13.675
15	21 45 51.63	1.9158	17 53 02.8	11.443	15	23 13 31.69	1.7613	7 42 14.3	13.705
16	21 47 46.44	1.9112	17 41 34.2	11.509	16	23 15 17.32	1.7598	7 28 31.1	13.733
17	21 49 40.97	1.9066	17 30 01.7	11.574	17	23 17 02.86	1.7582	7 14 46.3	13.761
18	21 51 35.23	1.9021	17 18 25.3	11.639	18	23 18 48.30	1.7567	7 00 59.8	13.788
19	21 53 29.22	1.8976	17 06 45.0	11.703	19	23 20 33.66	1.7553	6 47 11.7	13.814
20	21 55 22.94	1.8931	16 55 00.9	11.766	20	23 22 18.94	1.7539	6 33 22.1	13.840
21	21 57 16.39	1.8888	16 43 13.1	11.828	21	23 24 04.13	1.7527	6 19 30.9	13.865
22	21 59 09.59	1.8845	16 31 21.6	11.889	22	23 25 49.26	1.7515	6 05 38.3	13.888
23	22 01 02.53	1.8802	16 19 26.4	11.949	23	23 27 34.31	1.7503	5 51 44.3	13.912
24	22 02 55.21	1.8760	—16 07 27.7	+12.008	24	23 29 19.29	1.7492	—5 37 48.9	+13.935

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Wednesday, April 15.					Friday, April 17.				
00	23 29 19.29	1.7492	- 5 37 48.9	+13.935	00	00 53 20.68	1.7782	+ 5 43 12.1	+14.149
01	23 31 04.21	1.7482	5 23 52.1	13.957	01	00 55 07.44	1.7805	5 57 20.6	14.134
02	23 32 49.07	1.7473	5 09 54.1	13.978	02	00 56 54.34	1.7829	6 11 28.2	14.119
03	23 34 33.88	1.7464	4 55 54.8	13.998	03	00 58 41.39	1.7853	6 25 34.9	14.102
04	23 36 18.64	1.7456	4 41 54.3	14.018	04	01 00 28.58	1.7878	6 39 40.5	14.084
05	23 38 03.35	1.7448	4 27 52.6	14.038	05	01 02 15.93	1.7904	6 53 45.0	14.067
06	23 39 48.02	1.7442	4 13 49.8	14.056	06	01 04 03.43	1.7930	7 07 48.5	14.048
07	23 41 32.65	1.7436	3 59 45.9	14.073	07	01 05 51.09	1.7957	7 21 50.8	14.028
08	23 43 17.25	1.7431	3 45 41.1	14.089	08	01 07 38.91	1.7984	7 35 51.8	14.007
09	23 45 01.82	1.7426	3 31 35.2	14.107	09	01 09 26.90	1.8013	7 49 51.6	13.985
10	23 46 46.36	1.7422	3 17 28.3	14.122	10	01 11 15.07	1.8043	8 03 50.0	13.963
11	23 48 30.88	1.7418	3 03 20.6	14.136	11	01 13 03.41	1.8072	8 17 47.1	13.939
12	23 50 15.38	1.7416	2 49 12.0	14.150	12	01 14 51.93	1.8103	8 31 42.7	13.915
13	23 51 59.87	1.7414	2 35 02.6	14.163	13	01 16 40.64	1.8133	8 45 36.9	13.890
14	23 53 44.35	1.7413	2 20 52.4	14.176	14	01 18 29.53	1.8165	8 59 29.5	13.863
15	23 55 28.82	1.7413	2 06 41.5	14.188	15	01 20 18.62	1.8198	9 13 20.5	13.836
16	23 57 13.30	1.7413	1 52 29.9	14.199	16	01 22 07.90	1.8230	9 27 09.8	13.808
17	23 58 57.77	1.7413	1 38 17.6	14.209	17	01 23 57.38	1.8264	9 40 57.5	13.779
18	00 00 42.26	1.7415	1 24 04.8	14.218	18	01 25 47.07	1.8299	9 54 43.3	13.749
19	00 02 26.75	1.7418	1 09 51.4	14.228	19	01 27 36.97	1.8333	10 08 27.4	13.719
20	00 04 11.27	1.7421	0 55 37.5	14.236	20	01 29 27.07	1.8369	10 22 09.6	13.687
21	00 05 55.80	1.7423	0 41 23.1	14.243	21	01 31 17.40	1.8406	10 35 49.8	13.653
22	00 07 40.35	1.7428	0 27 08.4	14.249	22	01 33 07.94	1.8443	10 49 28.0	13.620
23	00 09 24.94	1.7433	- 0 12 53.2	+14.256	23	01 34 58.71	1.8481	+11 03 04.2	+13.585
Thursday, April 16.					Saturday, April 18.				
00	00 11 09.55	1.7438	+ 0 01 22.3	+14.261	00	01 36 49.71	1.8519	+11 16 38.2	+13.549
01	00 12 54.20	1.7445	0 15 38.1	14.265	01	01 38 40.94	1.8558	11 30 10.1	13.513
02	00 14 38.89	1.7452	0 29 54.1	14.268	02	01 40 32.40	1.8598	11 43 39.7	13.475
03	00 16 23.62	1.7460	0 44 10.3	14.271	03	01 42 24.11	1.8638	11 57 07.1	13.437
04	00 18 08.41	1.7469	0 58 26.6	14.273	04	01 44 16.06	1.8678	12 10 32.1	13.397
05	00 19 53.25	1.7478	1 12 43.0	14.274	05	01 46 08.25	1.8720	12 23 54.7	13.357
06	00 21 38.14	1.7488	1 26 59.5	14.275	06	01 48 00.70	1.8763	12 37 14.9	13.315
07	00 23 23.10	1.7498	1 41 16.0	14.275	07	01 49 53.40	1.8805	12 50 32.5	13.272
08	00 25 08.12	1.7509	1 55 32.5	14.274	08	01 51 46.36	1.8848	13 03 47.5	13.228
09	00 26 53.21	1.7521	2 09 48.9	14.272	09	01 53 39.58	1.8893	13 16 59.8	13.183
10	00 28 38.37	1.7533	2 24 05.1	14.269	10	01 55 33.07	1.8938	13 30 09.5	13.138
11	00 30 23.61	1.7547	2 38 21.2	14.266	11	01 57 26.83	1.8983	13 43 16.4	13.091
12	00 32 08.93	1.7561	2 52 37.0	14.262	12	01 59 20.86	1.9028	13 56 20.4	13.043
13	00 33 54.34	1.7576	3 06 52.6	14.257	13	02 01 15.17	1.9075	14 09 21.5	12.994
14	00 35 39.84	1.7591	3 21 07.8	14.251	14	02 03 09.76	1.9122	14 22 19.7	12.944
15	00 37 25.43	1.7607	3 35 22.7	14.245	15	02 05 04.63	1.9170	14 35 14.8	12.893
16	00 39 11.12	1.7623	3 49 37.2	14.238	16	02 06 59.80	1.9218	14 48 06.8	12.841
17	00 40 56.91	1.7641	4 03 51.2	14.229	17	02 08 55.25	1.9267	15 00 55.7	12.788
18	00 42 42.81	1.7659	4 18 04.7	14.220	18	02 10 51.00	1.9316	15 13 41.3	12.733
19	00 44 28.82	1.7678	4 32 17.6	14.210	19	02 12 47.04	1.9366	15 26 23.7	12.678
20	00 46 14.95	1.7698	4 46 29.9	14.200	20	02 14 43.39	1.9417	15 39 02.6	12.621
21	00 48 01.19	1.7718	5 00 41.6	14.188	21	02 16 40.04	1.9468	15 51 38.2	12.563
22	00 49 47.56	1.7739	5 14 52.5	14.176	22	02 18 37.00	1.9519	16 04 10.2	12.504
23	00 51 34.06	1.7760	5 29 02.7	14.163	23	02 20 34.27	1.9572	16 16 38.7	12.444
24	00 53 20.68	1.7782	+ 5 43 12.1	+14.149	24	02 22 31.86	1.9624	+16 29 03.5	+12.383

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Sunday, April 19.					Tuesday, April 21.				
00	02 22 31 ^s 86	1 ^s 9624	+16 29 03 ^{''} 5	+12 ^{''} 383	00	04 03 33 ^s 76	2 ^s 2562	+24 50 05 ^{''} 0	+ 8 ^{''} 008
01	02 24 29 ^s 76	1 ^s 9678	16 41 24 ^{''} 7	12 ^{''} 322	01	04 05 49 ^s 32	2 ^s 2625	24 58 01 ^{''} 8	7 ^{''} 886
02	02 26 27 ^s 99	1 ^s 9732	16 53 42 ^{''} 1	12 ^{''} 258	02	04 08 05 ^s 26	2 ^s 2688	25 05 51 ^{''} 3	7 ^{''} 763
03	02 28 26 ^s 54	1 ^s 9785	17 05 55 ^{''} 6	12 ^{''} 193	03	04 10 21 ^s 57	2 ^s 2751	25 13 33 ^{''} 3	7 ^{''} 637
04	02 30 25 ^s 41	1 ^s 9840	17 18 05 ^{''} 2	12 ^{''} 128	04	04 12 38 ^s 27	2 ^s 2814	25 21 07 ^{''} 7	7 ^{''} 511
05	02 32 24 ^s 62	1 ^s 9896	17 30 10 ^{''} 9	12 ^{''} 060	05	04 14 55 ^s 34	2 ^s 2876	25 28 34 ^{''} 6	7 ^{''} 383
06	02 34 24 ^s 16	1 ^s 9951	17 42 12 ^{''} 4	11 ^{''} 992	06	04 17 12 ^s 78	2 ^s 2938	25 35 53 ^{''} 7	7 ^{''} 254
07	02 36 24 ^s 03	2 ^s 0007	17 54 09 ^{''} 9	11 ^{''} 923	07	04 19 30 ^s 60	2 ^s 3000	25 43 05 ^{''} 1	7 ^{''} 124
08	02 38 24 ^s 24	2 ^s 0064	18 06 03 ^{''} 2	11 ^{''} 853	08	04 21 48 ^s 78	2 ^s 3060	25 50 08 ^{''} 6	6 ^{''} 993
09	02 40 24 ^s 80	2 ^s 0122	18 17 52 ^{''} 2	11 ^{''} 781	09	04 24 07 ^s 32	2 ^s 3121	25 57 04 ^{''} 3	6 ^{''} 861
10	02 42 25 ^s 70	2 ^s 0178	18 29 36 ^{''} 9	11 ^{''} 708	10	04 26 26 ^s 23	2 ^s 3182	26 03 51 ^{''} 9	6 ^{''} 727
11	02 44 26 ^s 94	2 ^s 0237	18 41 17 ^{''} 2	11 ^{''} 634	11	04 28 45 ^s 50	2 ^s 3242	26 10 31 ^{''} 5	6 ^{''} 592
12	02 46 28 ^s 54	2 ^s 0296	18 52 53 ^{''} 0	11 ^{''} 559	12	04 31 05 ^s 13	2 ^s 3301	26 17 02 ^{''} 9	6 ^{''} 456
13	02 48 30 ^s 49	2 ^s 0354	19 04 24 ^{''} 3	11 ^{''} 483	13	04 33 25 ^s 11	2 ^s 3360	26 23 26 ^{''} 2	6 ^{''} 318
14	02 50 32 ^s 79	2 ^s 0413	19 15 50 ^{''} 9	11 ^{''} 404	14	04 35 45 ^s 45	2 ^s 3418	26 29 41 ^{''} 1	6 ^{''} 179
15	02 52 35 ^s 45	2 ^s 0473	19 27 12 ^{''} 8	11 ^{''} 326	15	04 38 06 ^s 13	2 ^s 3476	26 35 47 ^{''} 7	6 ^{''} 040
16	02 54 38 ^s 46	2 ^s 0533	19 38 30 ^{''} 0	11 ^{''} 246	16	04 40 27 ^s 16	2 ^s 3533	26 41 45 ^{''} 9	5 ^{''} 898
17	02 56 41 ^s 84	2 ^s 0594	19 49 42 ^{''} 3	11 ^{''} 164	17	04 42 48 ^s 53	2 ^s 3590	26 47 35 ^{''} 5	5 ^{''} 756
18	02 58 45 ^s 59	2 ^s 0654	20 00 49 ^{''} 7	11 ^{''} 082	18	04 45 10 ^s 24	2 ^s 3647	26 53 16 ^{''} 6	5 ^{''} 613
19	03 00 49 ^s 69	2 ^s 0715	20 11 52 ^{''} 1	10 ^{''} 998	19	04 47 32 ^s 29	2 ^s 3702	26 58 49 ^{''} 1	5 ^{''} 469
20	03 02 54 ^s 17	2 ^s 0777	20 22 49 ^{''} 4	10 ^{''} 913	20	04 49 54 ^s 66	2 ^s 3756	27 04 12 ^{''} 9	5 ^{''} 324
21	03 04 59 ^s 01	2 ^s 0838	20 33 41 ^{''} 6	10 ^{''} 826	21	04 52 17 ^s 36	2 ^s 3810	27 09 28 ^{''} 0	5 ^{''} 178
22	03 07 04 ^s 23	2 ^s 0901	20 44 28 ^{''} 5	10 ^{''} 738	22	04 54 40 ^s 38	2 ^s 3863	27 14 34 ^{''} 2	5 ^{''} 029
23	03 09 09 ^s 82	2 ^s 0963	+20 55 10 ^{''} 2	+10 ^{''} 650	23	04 57 03 ^s 72	2 ^s 3916	+27 19 31 ^{''} 5	+ 4 ^{''} 881
Monday, April 20.					Wednesday, April 22.				
00	03 11 15 ^s 78	2 ^s 1025	+21 05 46 ^{''} 5	+10 ^{''} 559	00	04 59 27 ^s 37	2 ^s 3968	+27 24 19 ^{''} 9	+ 4 ^{''} 732
01	03 13 22 ^s 12	2 ^s 1088	21 16 17 ^{''} 3	10 ^{''} 468	01	05 01 51 ^s 33	2 ^s 4018	27 28 59 ^{''} 3	4 ^{''} 580
02	03 15 28 ^s 83	2 ^s 1151	21 26 42 ^{''} 7	10 ^{''} 376	02	05 04 15 ^s 59	2 ^s 4068	27 33 29 ^{''} 5	4 ^{''} 428
03	03 17 35 ^s 93	2 ^s 1215	21 37 02 ^{''} 4	10 ^{''} 281	03	05 06 40 ^s 15	2 ^s 4118	27 37 50 ^{''} 6	4 ^{''} 275
04	03 19 43 ^s 41	2 ^s 1278	21 47 16 ^{''} 4	10 ^{''} 186	04	05 09 05 ^s 01	2 ^s 4167	27 42 02 ^{''} 5	4 ^{''} 122
05	03 21 51 ^s 26	2 ^s 1341	21 57 24 ^{''} 7	10 ^{''} 089	05	05 11 30 ^s 15	2 ^s 4213	27 46 05 ^{''} 2	3 ^{''} 967
06	03 23 59 ^s 50	2 ^s 1406	22 07 27 ^{''} 1	9 ^{''} 992	06	05 13 55 ^s 57	2 ^s 4260	27 49 58 ^{''} 5	3 ^{''} 811
07	03 26 08 ^s 13	2 ^s 1469	22 17 23 ^{''} 7	9 ^{''} 893	07	05 16 21 ^s 27	2 ^s 4306	27 53 42 ^{''} 5	3 ^{''} 654
08	03 28 17 ^s 13	2 ^s 1533	22 27 14 ^{''} 2	9 ^{''} 792	08	05 18 47 ^s 24	2 ^s 4350	27 57 17 ^{''} 0	3 ^{''} 496
09	03 30 26 ^s 52	2 ^s 1598	22 36 58 ^{''} 7	9 ^{''} 690	09	05 21 13 ^s 47	2 ^s 4394	28 00 42 ^{''} 0	3 ^{''} 338
10	03 32 36 ^s 30	2 ^s 1662	22 46 37 ^{''} 0	9 ^{''} 587	10	05 23 39 ^s 97	2 ^s 4437	28 03 57 ^{''} 5	3 ^{''} 178
11	03 34 46 ^s 46	2 ^s 1726	22 56 09 ^{''} 1	9 ^{''} 483	11	05 26 06 ^s 71	2 ^s 4478	28 07 03 ^{''} 3	3 ^{''} 017
12	03 36 57 ^s 01	2 ^s 1791	23 05 34 ^{''} 9	9 ^{''} 377	12	05 28 33 ^s 71	2 ^s 4519	28 09 59 ^{''} 5	2 ^{''} 856
13	03 39 07 ^s 95	2 ^s 1855	23 14 54 ^{''} 3	9 ^{''} 270	13	05 31 00 ^s 94	2 ^s 4558	28 12 46 ^{''} 0	2 ^{''} 694
14	03 41 19 ^s 27	2 ^s 1919	23 24 07 ^{''} 3	9 ^{''} 163	14	05 33 28 ^s 41	2 ^s 4598	28 15 22 ^{''} 8	2 ^{''} 532
15	03 43 30 ^s 98	2 ^s 1984	23 33 13 ^{''} 8	9 ^{''} 053	15	05 35 56 ^s 11	2 ^s 4635	28 17 49 ^{''} 8	2 ^{''} 368
16	03 45 43 ^s 08	2 ^s 2049	23 42 13 ^{''} 6	8 ^{''} 942	16	05 38 24 ^s 03	2 ^s 4671	28 20 06 ^{''} 9	2 ^{''} 203
17	03 47 55 ^s 57	2 ^s 2113	23 51 06 ^{''} 8	8 ^{''} 829	17	05 40 52 ^s 16	2 ^s 4706	28 22 14 ^{''} 1	2 ^{''} 038
18	03 50 08 ^s 44	2 ^s 2178	23 59 53 ^{''} 1	8 ^{''} 716	18	05 43 20 ^s 50	2 ^s 4739	28 24 11 ^{''} 4	1 ^{''} 872
19	03 52 21 ^s 70	2 ^s 2242	24 08 32 ^{''} 7	8 ^{''} 602	19	05 45 49 ^s 03	2 ^s 4772	28 25 58 ^{''} 7	1 ^{''} 705
20	03 54 35 ^s 34	2 ^s 2306	24 17 05 ^{''} 3	8 ^{''} 485	20	05 48 17 ^s 76	2 ^s 4804	28 27 36 ^{''} 0	1 ^{''} 538
21	03 56 49 ^s 37	2 ^s 2371	24 25 30 ^{''} 9	8 ^{''} 368	21	05 50 46 ^s 68	2 ^s 4835	28 29 03 ^{''} 2	1 ^{''} 370
22	03 59 03 ^s 79	2 ^s 2434	24 33 49 ^{''} 5	8 ^{''} 250	22	05 53 15 ^s 78	2 ^s 4864	28 30 20 ^{''} 4	1 ^{''} 202
23	04 01 18 ^s 58	2 ^s 2498	24 42 00 ^{''} 9	8 ^{''} 129	23	05 55 45 ^s 05	2 ^s 4892	28 31 27 ^{''} 4	1 ^{''} 032
24	04 03 33 ^s 76	2 ^s 2562	+24 50 05 ^{''} 0	+ 8 ^{''} 008	24	05 58 14 ^s 48	2 ^s 4918	+28 32 24 ^{''} 2	+ 0 ^{''} 863

MOON, 1931.

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Thursday, April 23.					Saturday, April 25.				
00	05 58 14.48	2.4918	+28 32 24.2	+ 0.863	00	07 58 31.43	2.4738	+25 54 07.7	- 7.500
01	06 00 44.07	2.4944	28 33 10.9	0.693	01	08 00 59.77	2.4708	25 46 38.3	7.501
02	06 03 13.81	2.4968	28 33 47.3	0.521	02	08 03 27.93	2.4677	25 38 59.2	7.503
03	06 05 43.69	2.4992	28 34 13.4	0.350	03	08 05 55.89	2.4644	25 31 10.2	7.505
04	06 08 13.71	2.5013	28 34 29.3	0.178	04	08 08 23.66	2.4613	25 23 11.6	8.507
05	06 10 43.85	2.5033	28 34 34.8	+ 0.006	05	08 10 51.24	2.4579	25 15 03.4	8.509
06	06 13 14.11	2.5053	28 34 30.0	- 0.166	06	08 13 18.61	2.4545	25 06 45.5	8.511
07	06 15 44.48	2.5071	28 34 14.9	0.338	07	08 15 45.78	2.4510	24 58 18.2	8.513
08	06 18 14.96	2.5088	28 33 49.4	0.512	08	08 18 12.73	2.4475	24 49 41.3	8.515
09	06 20 45.53	2.5103	28 33 13.4	0.686	09	08 20 39.48	2.4440	24 40 55.0	8.517
10	06 23 16.19	2.5117	28 32 27.1	0.859	10	08 23 06.01	2.4403	24 31 59.4	8.519
11	06 25 46.93	2.5129	28 31 30.3	1.034	11	08 25 32.32	2.4367	24 22 54.4	8.521
12	06 28 17.74	2.5141	28 30 23.0	1.208	12	08 27 58.41	2.4329	24 13 40.1	8.523
13	06 30 48.62	2.5151	28 29 05.3	1.383	13	08 30 24.27	2.4291	24 04 16.7	8.525
14	06 33 19.55	2.5159	28 27 37.0	1.558	14	08 32 49.90	2.4253	23 54 44.2	8.527
15	06 35 50.52	2.5167	28 25 58.3	1.733	15	08 35 15.30	2.4214	23 45 02.5	8.529
16	06 38 21.55	2.5173	28 24 09.1	1.908	16	08 37 40.47	2.4174	23 35 11.0	8.531
17	06 40 52.61	2.5178	28 22 09.3	2.083	17	08 40 05.39	2.4135	23 25 12.3	8.533
18	06 43 23.69	2.5181	28 19 59.1	2.258	18	08 42 30.09	2.4096	23 15 03.8	8.535
19	06 45 54.78	2.5183	28 17 38.3	2.434	19	08 44 54.54	2.4055	23 04 46.6	8.537
20	06 48 25.89	2.5185	28 15 07.0	2.609	20	08 47 18.75	2.4014	22 54 20.5	8.539
21	06 50 57.00	2.5185	28 12 25.2	2.784	21	08 49 42.71	2.3973	22 43 45.8	8.541
22	06 53 28.11	2.5183	28 09 32.9	2.959	22	08 52 06.43	2.3933	22 33 02.5	8.543
23	06 55 59.20	2.5180	+28 06 30.1	- 3.135	23	08 54 29.90	2.3891	+22 22 10.6	8.545
Friday, April 24.					Sunday, April 26.				
00	06 58 30.27	2.5176	+28 03 16.7	- 3.310	00	08 56 53.12	2.3849	+22 11 10.3	- 11.075
01	07 01 01.31	2.5171	27 59 52.9	3.485	01	08 59 16.09	2.3808	22 00 01.6	11.076
02	07 03 32.32	2.5164	27 56 18.5	3.660	02	09 01 38.82	2.3766	21 48 44.5	11.077
03	07 06 03.28	2.5156	27 52 33.7	3.834	03	09 04 01.28	2.3723	21 37 19.2	11.078
04	07 08 34.19	2.5148	27 48 38.4	4.009	04	09 06 23.50	2.3683	21 25 45.7	11.079
05	07 11 05.05	2.5138	27 44 32.6	4.183	05	09 08 45.47	2.3640	21 14 04.1	11.080
06	07 13 35.84	2.5126	27 40 16.5	4.356	06	09 11 07.18	2.3598	21 02 14.5	11.081
07	07 16 06.56	2.5113	27 35 49.9	4.530	07	09 13 28.64	2.3556	20 50 17.0	11.082
08	07 18 37.20	2.5099	27 31 12.9	4.703	08	09 15 49.85	2.3514	20 38 11.5	11.083
09	07 21 07.75	2.5084	27 26 25.5	4.877	09	09 18 10.81	2.3473	20 25 58.3	11.084
10	07 23 38.21	2.5068	27 21 27.7	5.049	10	09 20 31.52	2.3430	20 13 37.4	11.085
11	07 26 08.57	2.5052	27 16 19.6	5.221	11	09 22 51.97	2.3388	20 01 08.8	11.086
12	07 28 38.83	2.5034	27 11 01.2	5.393	12	09 25 12.17	2.3346	19 48 32.6	11.087
13	07 31 08.98	2.5014	27 05 32.5	5.563	13	09 27 32.12	2.3304	19 35 49.0	11.088
14	07 33 39.00	2.4993	26 59 53.6	5.734	14	09 29 51.82	2.3263	19 22 58.0	11.089
15	07 36 08.90	2.4973	26 54 04.4	5.904	15	09 32 11.27	2.3221	19 09 59.6	11.090
16	07 38 38.67	2.4950	26 48 05.1	6.074	16	09 34 30.47	2.3179	18 56 54.1	11.091
17	07 41 08.30	2.4927	26 41 55.5	6.243	17	09 36 49.42	2.3138	18 43 41.4	11.092
18	07 43 37.79	2.4903	26 35 35.9	6.411	18	09 39 08.13	2.3098	18 30 21.6	11.093
19	07 46 07.14	2.4878	26 29 06.2	6.579	19	09 41 26.60	2.3058	18 16 54.8	11.094
20	07 48 36.32	2.4851	26 22 26.4	6.746	20	09 43 44.82	2.3017	18 03 21.1	11.095
21	07 51 05.35	2.4825	26 15 36.7	6.913	21	09 46 02.80	2.2978	17 49 40.7	11.096
22	07 53 34.22	2.4797	26 08 36.9	7.078	22	09 48 20.55	2.2938	17 35 53.5	11.097
23	07 56 02.91	2.4768	26 01 27.3	7.243	23	09 50 38.05	2.2898	17 21 59.7	11.098
24	07 58 31.43	2.4738	+25 54 07.7	- 7.408	24	09 52 55.32	2.2859	+17 07 59.3	- 14.000

MOON, 1931.

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THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Monday, April 27.					Wednesday, April 29.				
00	09 52 55.32	2.2859	+17 07 59.3	-14.060	00	11 39 09.43	2.1665	+ 4 17 21.5	-17.428
01	09 55 12.36	2.2820	16 53 52.5	14.167	01	11 41 19.40	2.1658	3 59 54.9	17.458
02	09 57 29.16	2.2782	16 39 39.3	14.273	02	11 43 29.33	2.1653	3 42 26.5	17.486
03	09 59 45.74	2.2744	16 25 19.8	14.377	03	11 45 39.23	2.1648	3 24 56.6	17.511
04	10 02 02.09	2.2706	16 10 54.1	14.479	04	11 47 49.10	2.1643	3 07 25.2	17.536
05	10 04 18.21	2.2668	15 56 22.3	14.580	05	11 49 58.95	2.1640	2 49 52.3	17.558
06	10 06 34.11	2.2633	15 41 44.5	14.680	06	11 52 08.78	2.1638	2 32 18.2	17.578
07	10 08 49.80	2.2597	15 27 00.7	14.778	07	11 54 18.60	2.1637	2 14 42.9	17.597
08	10 11 05.27	2.2561	15 12 11.1	14.875	08	11 56 28.42	2.1636	1 57 06.5	17.614
09	10 13 20.53	2.2526	14 57 15.7	14.970	09	11 58 38.23	2.1635	1 39 29.2	17.629
10	10 15 35.58	2.2491	14 42 14.7	15.064	10	12 00 48.04	2.1636	1 21 51.0	17.643
11	10 17 50.42	2.2457	14 27 08.0	15.157	11	12 02 57.86	2.1638	1 04 12.0	17.655
12	10 20 05.06	2.2423	14 11 55.9	15.246	12	12 05 07.70	2.1641	0 46 32.4	17.664
13	10 22 19.50	2.2390	13 56 38.5	15.335	13	12 07 17.55	2.1644	0 28 52.3	17.673
14	10 24 33.74	2.2358	13 41 15.7	15.423	14	12 09 27.43	2.1649	+ 0 11 11.7	17.679
15	10 26 47.79	2.2326	13 25 47.8	15.508	15	12 11 37.34	2.1654	- 0 06 29.2	17.683
16	10 29 01.65	2.2295	13 10 14.7	15.593	16	12 13 47.28	2.1660	0 24 10.3	17.686
17	10 31 15.33	2.2264	12 54 36.7	15.675	17	12 15 57.26	2.1668	0 41 51.5	17.687
18	10 33 28.82	2.2233	12 38 53.7	15.757	18	12 18 07.29	2.1676	0 59 32.7	17.686
19	10 35 42.13	2.2204	12 23 05.9	15.836	19	12 20 17.37	2.1684	1 17 13.8	17.683
20	10 37 55.27	2.2176	12 07 13.4	15.913	20	12 22 27.50	2.1693	1 34 54.7	17.678
21	10 40 08.24	2.2148	11 51 16.3	15.990	21	12 24 37.68	2.1702	1 52 35.2	17.671
22	10 42 21.04	2.2119	11 35 14.6	16.065	22	12 26 47.92	2.1713	2 10 15.2	17.663
23	10 44 33.67	2.2093	+11 19 08.5	-16.138	23	12 28 58.24	2.1726	- 2 27 54.7	-17.653
Tuesday, April 28.					Thursday, April 30.				
00	10 46 46.15	2.2067	+11 02 58.0	-16.210	00	12 31 08.63	2.1738	- 2 45 33.6	-17.641
01	10 48 58.47	2.2042	10 46 43.3	16.280	01	12 33 19.10	2.1753	3 03 11.6	17.627
02	10 51 10.65	2.2017	10 30 24.4	16.348	02	12 35 29.66	2.1768	3 20 48.8	17.612
03	10 53 22.67	2.1993	10 14 01.5	16.414	03	12 37 40.31	2.1782	3 38 25.0	17.593
04	10 55 34.56	2.1969	9 57 34.7	16.479	04	12 39 51.04	2.1798	3 56 00.0	17.573
05	10 57 46.30	2.1946	9 41 04.0	16.543	05	12 42 01.88	2.1815	4 13 33.8	17.552
06	10 59 57.91	2.1925	9 24 29.5	16.605	06	12 44 12.82	2.1833	4 31 06.2	17.528
07	11 02 09.40	2.1904	9 07 51.4	16.665	07	12 46 23.87	2.1852	4 48 37.2	17.504
08	11 04 20.76	2.1883	8 51 09.7	16.723	08	12 48 35.04	2.1871	5 06 06.7	17.477
09	11 06 32.00	2.1863	8 34 24.6	16.780	09	12 50 46.32	2.1891	5 23 34.4	17.447
10	11 08 43.12	2.1845	8 17 36.1	16.836	10	12 52 57.73	2.1912	5 41 00.3	17.417
11	11 10 54.14	2.1827	8 00 44.3	16.889	11	12 55 09.26	2.1933	5 58 24.4	17.384
12	11 13 05.04	2.1809	7 43 49.4	16.940	12	12 57 20.93	2.1956	6 15 46.4	17.349
13	11 15 15.85	2.1793	7 26 51.5	16.990	13	12 59 32.73	2.1979	6 33 06.3	17.313
14	11 17 26.56	2.1778	7 09 50.6	17.039	14	13 01 44.68	2.2003	6 50 23.9	17.274
15	11 19 37.18	2.1763	6 52 46.8	17.086	15	13 03 56.77	2.2028	7 07 39.2	17.234
16	11 21 47.71	2.1748	6 35 40.3	17.131	16	13 06 09.01	2.2053	7 24 52.0	17.192
17	11 23 58.16	2.1736	6 18 31.1	17.174	17	13 08 21.41	2.2080	7 42 02.2	17.148
18	11 26 08.54	2.1723	6 01 19.4	17.216	18	13 10 33.97	2.2107	7 59 09.7	17.101
19	11 28 18.84	2.1711	5 44 05.2	17.256	19	13 12 46.69	2.2134	8 16 14.3	17.053
20	11 30 29.07	2.1700	5 26 48.7	17.293	20	13 14 59.58	2.2163	8 33 16.0	17.003
21	11 32 39.24	2.1691	5 09 30.0	17.329	21	13 17 12.64	2.2192	8 50 14.7	16.952
22	11 34 49.36	2.1682	4 52 09.2	17.364	22	13 19 25.88	2.2222	9 07 10.3	16.898
23	11 36 59.42	2.1673	4 34 46.3	17.397	23	13 21 39.30	2.2253	9 24 02.5	16.843
24	11 39 09.43	2.1665	+ 4 17 21.5	-17.428	24	13 23 52.91	2.2283	- 9 40 51.4	-16.786

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Friday, May 1.					Sunday, May 3.				
00	13 23 52.91	2.2283	- 9 40 51.4	-16.786	00	15 15 20.66	2.4256	-21 25 10.4	-11.882
01	13 26 06.70	2.2315	9 57 36.8	16.726	01	15 17 46.32	2.4298	21 36 59.0	11.738
02	13 28 20.69	2.2348	10 14 18.5	16.664	02	15 20 12.24	2.4341	21 48 39.0	11.594
03	13 30 34.87	2.2380	10 30 56.5	16.602	03	15 22 38.41	2.4383	22 00 10.3	11.448
04	13 32 49.25	2.2414	10 47 30.7	16.537	04	15 25 04.83	2.4424	22 11 32.8	11.301
05	13 35 03.84	2.2448	11 04 00.9	16.470	05	15 27 31.50	2.4465	22 22 46.4	11.152
06	13 37 18.63	2.2483	11 20 27.1	16.402	06	15 29 58.41	2.4506	22 33 51.0	11.002
07	13 39 33.64	2.2518	11 36 49.1	16.331	07	15 32 25.57	2.4546	22 44 46.6	10.851
08	13 41 48.85	2.2554	11 53 06.8	16.258	08	15 34 52.06	2.4584	22 55 33.1	10.698
09	13 44 04.29	2.2592	12 09 20.1	16.183	09	15 37 20.58	2.4623	23 06 10.4	10.545
10	13 46 19.95	2.2628	12 25 28.8	16.107	10	15 39 48.44	2.4662	23 16 38.5	10.389
11	13 48 35.83	2.2666	12 41 32.9	16.029	11	15 42 16.52	2.4699	23 26 57.1	10.233
12	13 50 51.94	2.2704	12 57 32.3	15.949	12	15 44 44.83	2.4737	23 37 06.4	10.076
13	13 53 08.28	2.2743	13 13 26.8	15.868	13	15 47 13.36	2.4773	23 47 06.2	9.917
14	13 55 24.86	2.2783	13 29 16.4	15.783	14	15 49 42.11	2.4808	23 56 56.4	9.757
15	13 57 41.67	2.2822	13 45 00.8	15.698	15	15 52 11.06	2.4843	24 06 37.0	9.596
16	13 59 58.72	2.2862	14 00 40.1	15.611	16	15 54 40.23	2.4878	24 16 07.9	9.433
17	14 02 16.01	2.2903	14 16 14.1	15.521	17	15 57 09.60	2.4911	24 25 29.0	9.271
18	14 04 33.55	2.2943	14 31 42.6	15.429	18	15 59 39.16	2.4943	24 34 40.4	9.107
19	14 06 51.33	2.2984	14 47 05.6	15.337	19	16 02 08.91	2.4975	24 43 41.8	8.942
20	14 09 09.36	2.3027	15 02 23.0	15.242	20	16 04 38.86	2.5006	24 52 33.4	8.776
21	14 11 27.65	2.3068	15 17 34.6	15.145	21	16 07 08.98	2.5035	25 01 14.9	8.608
22	14 13 46.18	2.3110	15 32 40.4	15.047	22	16 09 39.28	2.5065	25 09 46.4	8.441
23	14 16 04.97	2.3153	-15 47 40.2	-14.946	23	16 12 09.76	2.5093	-25 18 07.8	-8.273
Saturday, May 2.					Monday, May 4.				
00	14 18 24.02	2.3197	-16 02 33.9	-14.843	00	16 14 40.40	2.5120	-25 26 19.1	-8.103
01	14 20 43.33	2.3240	16 17 21.4	14.740	01	16 17 11.20	2.5146	25 34 20.2	7.933
02	14 23 02.90	2.3283	16 32 02.7	14.634	02	16 19 42.15	2.5171	25 42 11.0	7.761
03	14 25 22.73	2.3327	16 46 37.5	14.527	03	16 22 13.25	2.5195	25 49 51.5	7.588
04	14 27 42.82	2.3371	17 01 05.9	14.418	04	16 24 44.49	2.5218	25 57 21.6	7.416
05	14 30 03.18	2.3415	17 15 27.6	14.306	05	16 27 15.86	2.5239	26 04 41.4	7.243
06	14 32 23.80	2.3459	17 29 42.6	14.193	06	16 29 47.36	2.5260	26 11 50.8	7.069
07	14 34 44.69	2.3503	17 43 50.8	14.079	07	16 32 18.98	2.5279	26 18 49.7	6.894
08	14 37 05.84	2.3548	17 57 52.1	13.963	08	16 34 50.71	2.5298	26 25 38.1	6.719
09	14 39 27.26	2.3593	18 11 46.4	13.845	09	16 37 22.55	2.5314	26 32 16.0	6.544
10	14 41 48.95	2.3638	18 25 33.5	13.725	10	16 39 54.48	2.5330	26 38 43.4	6.368
11	14 44 10.91	2.3683	18 39 13.4	13.604	11	16 42 26.51	2.5346	26 45 00.1	6.190
12	14 46 33.14	2.3727	18 52 46.0	13.482	12	16 44 58.63	2.5359	26 51 06.2	6.013
13	14 48 55.63	2.3772	19 06 11.2	13.357	13	16 47 30.82	2.5372	26 57 01.7	5.836
14	14 51 18.40	2.3817	19 19 28.8	13.230	14	16 50 03.09	2.5383	27 02 46.5	5.658
15	14 53 41.43	2.3861	19 32 38.8	13.103	15	16 52 35.41	2.5392	27 08 20.6	5.479
16	14 56 04.73	2.3906	19 45 41.1	12.973	16	16 55 07.79	2.5400	27 13 44.0	5.300
17	14 58 28.30	2.3950	19 58 35.6	12.843	17	16 57 40.21	2.5408	27 18 56.6	5.121
18	15 00 52.13	2.3994	20 11 22.2	12.710	18	17 00 12.68	2.5413	27 23 58.5	4.943
19	15 03 16.23	2.4039	20 24 00.8	12.575	19	17 02 45.17	2.5417	27 28 49.7	4.763
20	15 05 40.60	2.4083	20 36 31.2	12.439	20	17 05 17.68	2.5420	27 33 30.1	4.584
21	15 08 05.22	2.4126	20 48 53.5	12.303	21	17 07 50.21	2.5423	27 37 59.8	4.404
22	15 10 30.11	2.4169	21 01 07.6	12.164	22	17 10 22.75	2.5423	27 42 18.6	4.224
23	15 12 55.25	2.4213	-21 13 13.2	-12.023	23	17 12 55.28	2.5422	27 46 26.7	4.044
24	15 15 20.66	2.4256	-21 25 10.4	-11.882	24	17 15 27.81	2.5420	-27 50 23.9	-3.864

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Tuesday, May 5.					Thursday, May 7.				
00	17 15 27.81	2.5420	-27 50 23.9	-3.864	00	19 14 37.61	2.3772	-27 35 40.4	+4.205
01	17 18 00.32	2.5416	27 54 10.4	3.684	01	19 17 00.06	2.3712	27 31 23.7	4.352
02	17 20 32.80	2.5410	27 57 46.0	3.504	02	19 19 22.15	2.3651	27 26 58.2	4.497
03	17 23 05.24	2.5403	28 01 10.9	3.324	03	19 21 43.87	2.3590	27 22 24.1	4.640
04	17 25 37.64	2.5396	28 04 24.9	3.144	04	19 24 05.23	2.3528	27 17 41.4	4.783
05	17 28 09.99	2.5386	28 07 28.2	2.966	05	19 26 26.21	2.3466	27 12 50.2	4.924
06	17 30 42.27	2.5374	28 10 20.8	2.787	06	19 28 46.82	2.3404	27 07 50.5	5.064
07	17 33 14.48	2.5362	28 13 02.6	2.608	07	19 31 07.06	2.3341	27 02 42.5	5.203
08	17 35 46.61	2.5348	28 15 33.7	2.428	08	19 33 26.91	2.3277	26 57 26.2	5.341
09	17 38 18.66	2.5334	28 17 54.0	2.249	09	19 35 46.38	2.3213	26 52 01.6	5.478
10	17 40 50.62	2.5318	28 20 03.6	2.072	10	19 38 05.46	2.3148	26 46 28.8	5.613
11	17 43 22.47	2.5299	28 22 02.6	1.893	11	19 40 24.15	2.3083	26 40 48.0	5.747
12	17 45 54.21	2.5280	28 23 50.8	1.715	12	19 42 42.45	2.3018	26 34 59.2	5.879
13	17 48 25.83	2.5259	28 25 28.4	1.538	13	19 45 00.36	2.2952	26 29 02.5	6.011
14	17 50 57.32	2.5237	28 26 55.4	1.362	14	19 47 17.87	2.2885	26 22 57.9	6.142
15	17 53 28.68	2.5213	28 28 11.8	1.185	15	19 49 34.98	2.2818	26 16 45.5	6.271
16	17 55 59.88	2.5188	28 29 17.6	1.009	16	19 51 51.69	2.2752	26 10 25.4	6.398
17	17 58 30.94	2.5163	28 30 12.9	0.834	17	19 54 08.00	2.2685	26 03 57.7	6.525
18	18 01 01.83	2.5135	28 30 57.7	0.659	18	19 56 23.91	2.2618	25 57 22.4	6.650
19	18 03 32.56	2.5107	28 31 32.0	0.485	19	19 58 39.42	2.2552	25 50 39.7	6.774
20	18 06 03.11	2.5076	28 31 55.9	0.311	20	20 00 54.53	2.2484	25 43 49.5	6.897
21	18 08 33.47	2.5044	28 32 09.3	-0.138	21	20 03 09.23	2.2416	25 36 52.1	7.018
22	18 11 03.64	2.5012	28 32 12.5	+0.033	22	20 05 23.52	2.2348	25 29 47.3	7.139
23	18 13 33.62	2.4978	-28 32 05.4	+0.205	23	20 07 37.40	2.2280	-25 22 35.4	+7.258
Wednesday, May 6.					Friday, May 8.				
00	18 16 03.38	2.4943	-28 31 47.9	+0.377	00	20 09 50.88	2.2213	-25 15 16.4	+7.375
01	18 18 32.93	2.4907	28 31 20.2	0.547	01	20 12 03.95	2.2145	25 07 50.4	7.492
02	18 21 02.26	2.4868	28 30 42.3	0.716	02	20 14 16.62	2.2077	25 00 17.4	7.607
03	18 23 31.35	2.4829	28 29 54.3	0.884	03	20 16 28.87	2.2008	24 52 37.6	7.721
04	18 26 00.21	2.4789	28 28 56.2	1.052	04	20 18 40.71	2.1940	24 44 50.9	7.833
05	18 28 28.82	2.4748	28 27 48.1	1.219	05	20 20 52.15	2.1873	24 36 57.6	7.944
06	18 30 57.18	2.4706	28 26 29.9	1.386	06	20 23 03.18	2.1804	24 28 57.6	8.055
07	18 33 25.29	2.4663	28 25 01.8	1.550	07	20 25 13.80	2.1737	24 20 51.0	8.164
08	18 35 53.13	2.4618	28 23 23.9	1.714	08	20 27 24.02	2.1669	24 12 37.9	8.272
09	18 38 20.70	2.4572	28 21 36.1	1.878	09	20 29 33.83	2.1601	24 04 18.4	8.378
10	18 40 47.99	2.4524	28 19 38.5	2.040	10	20 31 43.23	2.1533	23 55 52.5	8.483
11	18 43 14.99	2.4477	28 17 31.3	2.202	11	20 33 52.23	2.1467	23 47 20.4	8.587
12	18 45 41.71	2.4428	28 15 14.3	2.363	12	20 36 00.83	2.1400	23 38 42.1	8.690
13	18 48 08.13	2.4378	28 12 47.8	2.522	13	20 38 09.03	2.1333	23 29 57.6	8.792
14	18 50 34.25	2.4327	28 10 11.7	2.681	14	20 40 16.82	2.1265	23 21 07.1	8.892
15	18 53 00.05	2.4275	28 07 26.1	2.838	15	20 42 24.21	2.1199	23 12 10.6	8.991
16	18 55 25.55	2.4222	28 04 31.1	2.994	16	20 44 31.21	2.1133	23 03 08.2	9.088
17	18 57 50.72	2.4168	28 01 26.8	3.149	17	20 46 37.81	2.1067	22 54 00.0	9.186
18	19 00 15.57	2.4115	27 58 13.2	3.303	18	20 48 44.01	2.1002	22 44 45.9	9.282
19	19 02 40.10	2.4060	27 54 50.4	3.457	19	20 50 49.83	2.0937	22 35 26.2	9.376
20	19 05 04.29	2.4003	27 51 18.4	3.608	20	20 52 55.25	2.0871	22 26 00.8	9.469
21	19 07 28.14	2.3946	27 47 37.4	3.759	21	20 55 00.28	2.0807	22 16 29.9	9.561
22	19 09 51.64	2.3888	27 43 47.3	3.909	22	20 57 04.93	2.0743	22 06 53.5	9.653
23	19 12 14.80	2.3831	27 39 48.3	4.058	23	20 59 09.19	2.0678	21 57 11.6	9.743
24	19 14 37.61	2.3772	-27 35 40.4	+4.205	24	21 01 13.06	2.0614	-21 47 24.4	+9.831

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Saturday, May 9.					Monday, May 11.				
00	21 01 13.06	2.0614	-21 47 24.4	+9.831	00	22 33 49.53	1.8208	-12 32 57.8	+12.912
01	21 03 16.56	2.0552	21 37 31.9	9.918	01	22 35 38.67	1.8174	12 20 01.8	12.954
02	21 05 19.68	2.0489	21 27 34.2	10.005	02	22 37 27.62	1.8141	12 07 03.3	12.996
03	21 07 22.43	2.0427	21 17 31.3	10.091	03	22 39 16.36	1.8108	11 54 02.3	13.038
04	21 09 24.80	2.0364	21 07 23.3	10.175	04	22 41 04.91	1.8076	11 40 58.8	13.078
05	21 11 26.80	2.0303	20 57 10.3	10.258	05	22 42 53.27	1.8045	11 27 52.9	13.118
06	21 13 28.43	2.0242	20 46 52.4	10.339	06	22 44 41.45	1.8015	11 14 44.7	13.157
07	21 15 29.70	2.0182	20 36 29.6	10.421	07	22 46 29.45	1.7985	11 01 34.1	13.195
08	21 17 30.61	2.0122	20 26 01.9	10.501	08	22 48 17.27	1.7956	10 48 21.3	13.232
09	21 19 31.16	2.0062	20 15 29.5	10.579	09	22 50 04.92	1.7928	10 35 06.3	13.269
10	21 21 31.35	2.0003	20 04 52.4	10.658	10	22 51 52.40	1.7900	10 21 49.0	13.306
11	21 23 31.19	1.9944	19 54 10.6	10.734	11	22 53 39.72	1.7873	10 08 29.6	13.341
12	21 25 30.68	1.9886	19 43 24.3	10.810	12	22 55 26.88	1.7848	9 55 08.1	13.375
13	21 27 29.82	1.9828	19 32 33.4	10.884	13	22 57 13.89	1.7823	9 41 44.6	13.409
14	21 29 28.62	1.9772	19 21 38.2	10.958	14	22 59 00.75	1.7798	9 28 19.0	13.443
15	21 31 27.08	1.9716	19 10 38.5	11.031	15	23 00 47.47	1.7774	9 14 51.5	13.475
16	21 33 25.21	1.9660	18 59 34.5	11.103	16	23 02 34.04	1.7751	9 01 22.0	13.507
17	21 35 23.00	1.9604	18 48 26.2	11.173	17	23 04 20.48	1.7728	8 47 50.7	13.538
18	21 37 20.46	1.9549	18 37 13.7	11.243	18	23 06 06.78	1.7707	8 34 17.5	13.568
19	21 39 17.59	1.9495	18 25 57.1	11.311	19	23 07 52.96	1.7687	8 20 42.5	13.598
20	21 41 14.40	1.9442	18 14 36.4	11.379	20	23 09 39.02	1.7667	8 07 05.7	13.627
21	21 43 10.89	1.9388	18 03 11.6	11.446	21	23 11 24.96	1.7647	7 53 27.3	13.655
22	21 45 07.06	1.9337	17 51 42.9	11.512	22	23 13 10.78	1.7628	7 39 47.1	13.683
23	21 47 02.93	1.9285	-17 40 10.2	+11.577	23	23 14 56.49	1.7609	-7 26 05.4	+13.709
Sunday, May 10.					Tuesday, May 12.				
00	21 48 58.48	1.9233	-17 28 33.7	+11.641	00	23 16 42.09	1.7593	-7 12 22.0	+13.736
01	21 50 53.73	1.9183	17 16 53.3	11.703	01	23 18 27.60	1.7577	6 58 37.1	13.762
02	21 52 48.68	1.9133	17 05 09.3	11.765	02	23 20 13.01	1.7561	6 44 50.6	13.787
03	21 54 43.33	1.9084	16 53 21.5	11.827	03	23 21 58.33	1.7547	6 31 02.7	13.810
04	21 56 37.69	1.9036	16 41 30.1	11.887	04	23 23 43.57	1.7533	6 17 13.4	13.833
05	21 58 31.76	1.8988	16 29 35.1	11.947	05	23 25 28.72	1.7519	6 03 22.7	13.857
06	22 00 25.55	1.8941	16 17 36.5	12.005	06	23 27 13.80	1.7507	5 49 30.6	13.879
07	22 02 19.05	1.8894	16 05 34.5	12.062	07	23 28 58.80	1.7495	5 35 37.2	13.900
08	22 04 12.28	1.8848	15 53 29.1	12.118	08	23 30 43.74	1.7484	5 21 42.6	13.921
09	22 06 05.23	1.8803	15 41 20.3	12.175	09	23 32 28.61	1.7473	5 07 46.7	13.942
10	22 07 57.91	1.8758	15 29 08.1	12.230	10	23 34 13.42	1.7463	4 53 49.6	13.961
11	22 09 50.33	1.8715	15 16 52.7	12.283	11	23 35 58.17	1.7454	4 39 51.4	13.979
12	22 11 42.49	1.8672	15 04 34.1	12.337	12	23 37 42.87	1.7447	4 25 52.1	13.998
13	22 13 34.39	1.8629	14 52 12.3	12.389	13	23 39 27.53	1.7439	4 11 51.7	14.015
14	22 15 26.04	1.8588	14 39 47.4	12.441	14	23 41 12.14	1.7433	3 57 50.3	14.032
15	22 17 17.44	1.8547	14 27 19.4	12.491	15	23 42 56.72	1.7427	3 43 47.9	14.048
16	22 19 08.60	1.8506	14 14 48.5	12.541	16	23 44 41.26	1.7421	3 29 44.5	14.063
17	22 20 59.51	1.8466	14 02 14.5	12.591	17	23 46 25.77	1.7417	3 15 40.3	14.078
18	22 22 50.19	1.8427	13 49 37.6	12.638	18	23 48 10.26	1.7413	3 01 35.1	14.093
19	22 24 40.63	1.8388	13 36 57.9	12.686	19	23 49 54.73	1.7411	2 47 29.2	14.106
20	22 26 30.85	1.8351	13 24 15.3	12.733	20	23 51 39.19	1.7408	2 33 22.4	14.119
21	22 28 20.84	1.8314	13 11 30.0	12.778	21	23 53 23.63	1.7407	2 19 14.9	14.131
22	22 30 10.62	1.8278	12 58 41.9	12.823	22	23 55 08.07	1.7407	2 05 06.7	14.142
23	22 32 00.18	1.8243	12 45 51.2	12.868	23	23 56 52.51	1.7407	1 50 57.9	14.153
24	22 33 49.53	1.8208	-12 32 57.8	+12.912	24	23 58 36.95	1.7408	-1 36 48.4	+14.163

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Wednesday, May 13.					Friday, May 15.				
00	^h 23 ^m 58 ^s 36.95	1.7408	— 1° 36' 48".4	+14".163	00	^h 01 ^m 23 ^s 41.57	1.8327	+ 9° 40' 51".0	+13".774
01	00 00 21.40	1.7409	1 22 38.4	14.172	01	01 25 31.64	1.8364	9 54 36.6	13.746
02	00 02 05.86	1.7412	1 08 27.8	14.181	02	01 27 21.94	1.8403	10 08 20.5	13.718
03	00 03 50.34	1.7414	0 54 16.7	14.188	03	01 29 12.47	1.8441	10 22 02.7	13.687
04	00 05 34.83	1.7418	0 40 05.2	14.196	04	01 31 03.23	1.8480	10 35 42.9	13.655
05	00 07 19.35	1.7423	0 25 53.2	14.203	05	01 32 54.23	1.8520	10 49 21.3	13.623
06	00 09 03.91	1.7428	— 0 11 40.8	14.208	06	01 34 45.47	1.8561	11 02 57.7	13.590
07	00 10 48.49	1.7434	+ 0 02 31.8	14.213	07	01 36 36.96	1.8603	11 16 32.1	13.556
08	00 12 33.12	1.7442	0 16 44.8	14.218	08	01 38 28.70	1.8645	11 30 04.4	13.521
09	00 14 17.79	1.7448	0 30 58.0	14.222	09	01 40 20.70	1.8688	11 43 34.6	13.485
10	00 16 02.50	1.7457	0 45 11.4	14.225	10	01 42 12.95	1.8731	11 57 02.6	13.448
11	00 17 47.27	1.7467	0 59 25.0	14.228	11	01 44 05.47	1.8775	12 10 28.4	13.410
12	00 19 32.10	1.7477	1 13 38.7	14.229	12	01 45 58.25	1.8819	12 23 51.8	13.370
13	00 21 16.99	1.7487	1 27 52.5	14.230	13	01 47 51.30	1.8865	12 37 12.8	13.330
14	00 23 01.94	1.7498	1 42 06.3	14.230	14	01 49 44.63	1.8912	12 50 31.4	13.289
15	00 24 46.97	1.7511	1 56 20.1	14.229	15	01 51 38.24	1.8958	13 03 47.5	13.248
16	00 26 32.07	1.7523	2 10 33.8	14.228	16	01 53 32.13	1.9007	13 17 01.1	13.204
17	00 28 17.25	1.7537	2 24 47.5	14.227	17	01 55 26.32	1.9055	13 30 12.0	13.159
18	00 30 02.51	1.7551	2 39 01.0	14.223	18	01 57 20.79	1.9103	13 43 20.2	13.114
19	00 31 47.86	1.7566	2 53 14.3	14.220	19	01 59 15.56	1.9153	13 56 25.7	13.068
20	00 33 33.30	1.7582	3 07 27.4	14.217	20	02 01 10.62	1.9203	14 09 28.3	13.019
21	00 35 18.84	1.7599	3 21 40.3	14.212	21	02 03 05.99	1.9254	14 22 28.0	12.970
22	00 37 04.49	1.7617	3 35 52.8	14.205	22	02 05 01.67	1.9305	14 35 24.7	12.921
23	00 38 50.24	1.7634	+ 3 50 04.9	+14.199	23	02 06 57.65	1.9357	+14 48 18.5	+12.870
Thursday, May 14.					Saturday, May 16.				
00	00 40 36.10	1.7653	+ 4 04 16.7	+14.193	00	02 08 53.95	1.9410	+15 01 09.1	+12.818
01	00 42 22.08	1.7673	4 18 28.0	14.184	01	02 10 50.57	1.9463	15 13 56.6	12.764
02	00 44 08.17	1.7693	4 32 38.8	14.175	02	02 12 47.51	1.9517	15 26 40.8	12.709
03	00 45 54.39	1.7714	4 46 49.0	14.166	03	02 14 44.77	1.9572	15 39 21.7	12.654
04	00 47 40.74	1.7736	5 00 58.7	14.156	04	02 16 42.37	1.9627	15 51 59.3	12.598
05	00 49 27.22	1.7758	5 15 07.7	14.144	05	02 18 40.29	1.9682	16 04 33.5	12.540
06	00 51 13.84	1.7783	5 29 16.0	14.133	06	02 20 38.55	1.9738	16 17 04.1	12.481
07	00 53 00.61	1.7807	5 43 23.6	14.120	07	02 22 37.15	1.9795	16 29 31.2	12.420
08	00 54 47.52	1.7830	5 57 30.4	14.107	08	02 24 36.09	1.9853	16 41 54.5	12.358
09	00 56 34.57	1.7856	6 11 36.4	14.092	09	02 26 35.38	1.9911	16 54 14.2	12.297
10	00 58 21.79	1.7883	6 25 41.4	14.077	10	02 28 35.02	1.9968	17 06 30.1	12.233
11	01 00 09.16	1.7909	6 39 45.6	14.061	11	02 30 35.00	2.0028	17 18 42.1	12.167
12	01 01 56.70	1.7938	6 53 48.7	14.043	12	02 32 35.35	2.0088	17 30 50.1	12.100
13	01 03 44.41	1.7966	7 07 50.8	14.027	13	02 34 36.05	2.0147	17 42 54.1	12.033
14	01 05 32.29	1.7994	7 21 51.9	14.008	14	02 36 37.11	2.0208	17 54 54.1	11.964
15	01 07 20.34	1.8024	7 35 51.8	13.988	15	02 38 38.54	2.0268	18 06 49.8	11.893
16	01 09 08.58	1.8056	7 49 50.5	13.968	16	02 40 40.33	2.0330	18 18 41.3	11.823
17	01 10 57.01	1.8087	8 03 47.9	13.947	17	02 42 42.50	2.0393	18 30 28.5	11.750
18	01 12 45.62	1.8118	8 17 44.1	13.925	18	02 44 45.04	2.0454	18 42 11.3	11.677
19	01 14 34.43	1.8152	8 31 38.9	13.903	19	02 46 47.95	2.0516	18 53 49.7	11.601
20	01 16 23.45	1.8186	8 45 32.4	13.878	20	02 48 51.23	2.0579	19 05 23.4	11.523
21	01 18 12.66	1.8219	8 59 24.3	13.853	21	02 50 54.90	2.0644	19 16 52.5	11.447
22	01 20 02.08	1.8255	9 13 14.8	13.828	22	02 52 58.96	2.0708	19 28 17.0	11.368
23	01 21 51.72	1.8291	9 27 03.7	13.802	23	02 55 03.39	2.0772	19 39 36.6	11.286
24	01 23 41.57	1.8327	+ 9 40 51.0	+13.774	24	02 57 08.22	2.0837	+19 50 51.3	+11.204

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Sunday, May 17.					Tuesday, May 19.				
00	02 57 08.22	2.0837	+19 50 51.3	+11.204	00	04 44 50.66	2.3982	+26 48 09.6	+5.654
01	02 59 13.43	2.0902	20 02 01.1	11.122	01	04 47 14.72	2.4038	26 53 44.4	5.506
02	03 01 19.04	2.0968	20 13 05.9	11.037	02	04 49 39.12	2.4094	26 59 10.3	5.356
03	03 03 25.04	2.1033	20 24 05.5	10.950	03	04 52 03.85	2.4149	27 04 27.1	5.205
04	03 05 31.43	2.1098	20 34 59.9	10.863	04	04 54 28.91	2.4203	27 09 34.9	5.053
05	03 07 38.22	2.1165	20 45 49.1	10.775	05	04 56 54.29	2.4257	27 14 33.5	4.900
06	03 09 45.41	2.1232	20 56 32.9	10.684	06	04 59 19.99	2.4308	27 19 22.9	4.746
07	03 11 53.00	2.1298	21 07 11.2	10.593	07	05 01 45.99	2.4359	27 24 03.0	4.590
08	03 14 00.98	2.1365	21 17 44.1	10.501	08	05 04 12.30	2.4409	27 28 33.7	4.434
09	03 16 09.38	2.1433	21 28 11.3	10.407	09	05 06 38.90	2.4458	27 32 55.1	4.278
10	03 18 18.17	2.1499	21 38 32.9	10.312	10	05 09 05.80	2.4507	27 37 07.0	4.118
11	03 20 27.37	2.1567	21 48 48.7	10.214	11	05 11 32.98	2.4553	27 41 09.3	3.959
12	03 22 36.98	2.1635	21 58 58.6	10.116	12	05 14 00.44	2.4600	27 45 02.1	3.799
13	03 24 46.99	2.1703	22 09 02.6	10.017	13	05 16 28.18	2.4645	27 48 45.2	3.638
14	03 26 57.41	2.1772	22 19 00.6	9.915	14	05 18 56.18	2.4688	27 52 18.6	3.476
15	03 29 08.25	2.1840	22 28 52.4	9.813	15	05 21 24.44	2.4731	27 55 42.3	3.312
16	03 31 19.49	2.1908	22 38 38.1	9.709	16	05 23 52.95	2.4773	27 58 56.0	3.148
17	03 33 31.14	2.1976	22 48 17.5	9.603	17	05 26 21.71	2.4813	28 02 00.0	2.983
18	03 35 43.20	2.2044	22 57 50.5	9.497	18	05 28 50.71	2.4852	28 04 54.0	2.817
19	03 37 55.67	2.2112	23 07 17.1	9.388	19	05 31 19.93	2.4889	28 07 38.0	2.650
20	03 40 08.54	2.2180	23 16 37.1	9.279	20	05 33 49.38	2.4926	28 10 12.0	2.483
21	03 42 21.83	2.2249	23 25 50.6	9.168	21	05 36 19.04	2.4961	28 12 35.9	2.314
22	03 44 35.53	2.2317	23 34 57.3	9.056	22	05 38 48.91	2.4996	28 14 49.7	2.146
23	03 46 49.63	2.2385	+23 43 57.3	+8.943	23	05 41 18.99	2.5028	+28 16 53.4	+1.976
Monday, May 18.					Wednesday, May 20.				
00	03 49 04.15	2.2453	+23 52 50.4	+8.828	00	05 43 49.25	2.5059	+28 18 46.8	+1.805
01	03 51 19.07	2.2521	24 01 36.6	8.711	01	05 46 19.70	2.5089	28 20 30.0	1.634
02	03 53 34.40	2.2589	24 10 15.7	8.593	02	05 48 50.32	2.5118	28 22 02.9	1.463
03	03 55 50.14	2.2657	24 18 47.7	8.473	03	05 51 21.11	2.5145	28 23 25.5	1.290
04	03 58 06.28	2.2723	24 27 12.5	8.353	04	05 53 52.06	2.5171	28 24 37.7	1.118
05	04 00 22.82	2.2791	24 35 30.0	8.230	05	05 56 23.16	2.5195	28 25 39.6	0.944
06	04 02 39.77	2.2858	24 43 40.1	8.107	06	05 58 54.40	2.5218	28 26 31.0	0.770
07	04 04 57.11	2.2923	24 51 42.8	7.983	07	06 01 25.78	2.5240	28 27 12.0	0.596
08	04 07 14.85	2.2989	24 59 38.0	7.856	08	06 03 57.28	2.5260	28 27 42.5	0.421
09	04 09 32.98	2.3055	25 07 25.5	7.728	09	06 06 28.96	2.5279	28 28 02.5	0.247
10	04 11 51.51	2.3121	25 15 05.4	7.599	10	06 09 00.63	2.5296	28 28 12.1	+0.072
11	04 14 10.43	2.3186	25 22 37.4	7.468	11	06 11 32.45	2.5312	28 28 11.1	-0.105
12	04 16 29.74	2.3251	25 30 01.6	7.337	12	06 14 04.37	2.5327	28 27 59.5	0.282
13	04 18 49.44	2.3315	25 37 17.9	7.204	13	06 16 36.37	2.5339	28 27 37.3	0.458
14	04 21 09.52	2.3378	25 44 26.1	7.069	14	06 19 08.44	2.5351	28 27 04.5	0.634
15	04 23 29.98	2.3442	25 51 26.2	6.933	15	06 21 40.58	2.5361	28 26 21.2	0.812
16	04 25 50.82	2.3504	25 58 18.1	6.797	16	06 24 12.77	2.5369	28 25 27.1	0.989
17	04 28 12.03	2.3566	26 05 01.8	6.658	17	06 26 45.01	2.5376	28 24 22.5	1.166
18	04 30 33.61	2.3628	26 11 37.1	6.518	18	06 29 17.28	2.5382	28 23 07.2	1.343
19	04 32 55.56	2.3688	26 18 04.0	6.378	19	06 31 49.59	2.5387	28 21 41.3	1.521
20	04 35 17.87	2.3748	26 24 22.4	6.236	20	06 34 21.92	2.5389	28 20 04.7	1.698
21	04 37 40.54	2.3808	26 30 32.3	6.092	21	06 36 54.26	2.5390	28 18 17.5	1.876
22	04 40 03.56	2.3867	26 36 33.4	5.947	22	06 39 26.60	2.5390	28 16 19.6	2.053
23	04 42 26.94	2.3925	26 42 25.9	5.802	23	06 41 58.94	2.5388	28 14 11.1	2.231
24	04 44 50.66	2.3982	+26 48 09.6	+5.654	24	06 44 31.26	2.5385	+28 11 51.9	-2.408

MOON, 1931.

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THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Thursday, May 21.					Saturday, May 23.				
00	06 44 31.26	2.5385	+28 11 51.9	-2.408	00	08 43 40.95	2.3903	+23 00 48.1	-10.247
01	06 47 03.56	2.5381	28 09 22.1	2.586	01	08 46 04.23	2.3855	22 50 29.1	10.386
02	06 49 35.83	2.5375	28 06 41.6	2.763	02	08 48 27.21	2.3806	22 40 01.8	10.523
03	06 52 08.06	2.5368	28 03 50.5	2.939	03	08 50 49.90	2.3758	22 29 26.3	10.661
04	06 54 40.24	2.5358	28 00 48.9	3.116	04	08 53 12.30	2.3708	22 18 42.5	10.797
05	06 57 12.36	2.5348	27 57 36.6	3.293	05	08 55 34.40	2.3659	22 07 50.7	10.930
06	06 59 44.42	2.5337	27 54 13.7	3.469	06	08 57 56.21	2.3610	21 56 50.9	11.063
07	07 02 16.41	2.5324	27 50 40.3	3.645	07	09 00 17.72	2.3561	21 45 43.2	11.194
08	07 04 48.31	2.5310	27 46 56.3	3.820	08	09 02 38.94	2.3512	21 34 27.6	11.325
09	07 07 20.13	2.5295	27 43 01.9	3.995	09	09 04 59.86	2.3462	21 23 04.2	11.454
10	07 09 51.85	2.5278	27 38 56.9	4.171	10	09 07 20.48	2.3412	21 11 33.1	11.582
11	07 12 23.47	2.5260	27 34 41.4	4.345	11	09 09 40.80	2.3363	20 59 54.4	11.708
12	07 14 54.97	2.5240	27 30 15.5	4.518	12	09 12 00.83	2.3313	20 48 08.2	11.832
13	07 17 26.35	2.5220	27 25 39.2	4.692	13	09 14 20.56	2.3264	20 36 14.6	11.955
14	07 19 57.61	2.5198	27 20 52.5	4.865	14	09 16 40.00	2.3214	20 24 13.6	12.078
15	07 22 28.73	2.5174	27 15 55.4	5.038	15	09 18 59.13	2.3165	20 12 05.3	12.198
16	07 24 59.70	2.5150	27 10 48.0	5.209	16	09 21 17.98	2.3116	19 59 49.8	12.317
17	07 27 30.53	2.5125	27 05 30.3	5.380	17	09 23 36.52	2.3067	19 47 27.3	12.434
18	07 30 01.20	2.5098	27 00 02.4	5.551	18	09 25 54.78	2.3018	19 34 57.7	12.551
19	07 32 31.71	2.5072	26 54 24.2	5.720	19	09 28 12.74	2.2970	19 22 21.2	12.666
20	07 35 02.06	2.5043	26 48 36.0	5.889	20	09 30 30.42	2.2922	19 09 37.8	12.780
21	07 37 32.22	2.5013	26 42 37.5	6.058	21	09 32 47.80	2.2873	18 56 47.6	12.892
22	07 40 02.21	2.4982	26 36 29.1	6.225	22	09 35 04.90	2.2826	18 43 50.8	13.002
23	07 42 32.00	2.4949	+26 30 10.5	-6.393	23	09 37 21.71	2.2778	+18 30 47.4	-13.112
Friday, May 22.					Sunday, May 24.				
00	07 45 01.60	2.4917	+26 23 42.0	-6.558	00	09 39 38.23	2.2730	+18 17 37.4	-13.220
01	07 47 31.00	2.4883	26 17 03.6	6.723	01	09 41 54.47	2.2684	18 04 21.0	13.326
02	07 50 00.19	2.4848	26 10 15.2	6.888	02	09 44 10.44	2.2638	17 50 58.3	13.431
03	07 52 29.18	2.4813	26 03 17.0	7.052	03	09 46 26.12	2.2591	17 37 29.3	13.534
04	07 54 57.94	2.4776	25 56 09.0	7.214	04	09 48 41.53	2.2545	17 23 54.2	13.636
05	07 57 26.49	2.4738	25 48 51.3	7.375	05	09 50 56.66	2.2499	17 10 13.0	13.737
06	07 59 54.80	2.4700	25 41 24.0	7.536	06	09 53 11.52	2.2455	16 56 25.8	13.836
07	08 02 22.89	2.4662	25 33 47.0	7.697	07	09 55 26.12	2.2411	16 42 32.7	13.934
08	08 04 50.74	2.4622	25 26 00.4	7.855	08	09 57 40.45	2.2367	16 28 33.7	14.030
09	08 07 18.35	2.4581	25 18 04.4	8.013	09	09 59 54.52	2.2323	16 14 29.1	14.124
10	08 09 45.71	2.4539	25 09 58.9	8.169	10	10 02 08.33	2.2280	16 00 18.8	14.218
11	08 12 12.82	2.4498	25 01 44.1	8.325	11	10 04 21.88	2.2237	15 46 02.9	14.310
12	08 14 39.68	2.4455	24 53 19.9	8.480	12	10 06 35.17	2.2195	15 31 41.6	14.400
13	08 17 06.28	2.4412	24 44 46.5	8.633	13	10 08 48.22	2.2153	15 17 14.9	14.489
14	08 19 32.62	2.4368	24 36 03.9	8.786	14	10 11 01.01	2.2113	15 02 42.9	14.576
15	08 21 58.69	2.4323	24 27 12.2	8.938	15	10 13 13.57	2.2073	14 48 05.8	14.662
16	08 24 24.49	2.4278	24 18 11.4	9.088	16	10 15 25.88	2.2033	14 33 23.5	14.747
17	08 26 50.02	2.4233	24 09 01.7	9.236	17	10 17 37.96	2.1994	14 18 36.2	14.829
18	08 29 15.28	2.4188	23 59 43.1	9.384	18	10 19 49.81	2.1955	14 03 44.0	14.911
19	08 31 40.27	2.4141	23 50 15.6	9.531	19	10 22 01.42	2.1917	13 48 46.9	14.992
20	08 34 04.97	2.4093	23 40 39.4	9.677	20	10 24 12.81	2.1880	13 33 45.0	15.070
21	08 36 29.39	2.4047	23 30 54.4	9.822	21	10 26 23.98	2.1843	13 18 38.5	15.147
22	08 38 53.53	2.4000	23 21 00.8	9.964	22	10 28 34.93	2.1807	13 03 27.4	15.223
23	08 41 17.39	2.3952	23 10 58.7	10.106	23	10 30 45.66	2.1772	12 48 11.8	15.297
24	08 43 40.95	2.3903	+23 00 48.1	-10.247	24	10 32 56.19	2.1738	+12 32 51.8	-15.369

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Monday, May 25.					Wednesday, May 27.				
00	10 32 56.19	2.1738	+12 32 51.8	-15.369	00	12 14 47.81	2.1034	- 0 40 22.0	-17.104
01	10 35 06.51	2.1704	12 17 27.5	15.441	01	12 16 54.03	2.1041	0 57 28.2	17.103
02	10 37 16.64	2.1671	12 01 58.9	15.511	02	12 19 00.30	2.1049	1 14 34.4	17.101
03	10 39 26.56	2.1638	11 46 26.2	15.578	03	12 21 06.62	2.1058	1 31 40.3	17.096
04	10 41 36.29	2.1606	11 30 49.5	15.645	04	12 23 13.00	2.1068	1 48 45.9	17.090
05	10 43 45.83	2.1575	11 15 08.8	15.711	05	12 25 19.43	2.1078	2 05 51.1	17.083
06	10 45 55.19	2.1546	10 59 24.2	15.775	06	12 27 25.93	2.1090	2 22 55.9	17.075
07	10 48 04.38	2.1516	10 43 35.8	15.838	07	12 29 32.51	2.1103	2 40 00.1	17.063
08	10 50 13.38	2.1487	10 27 43.7	15.898	08	12 31 39.16	2.1115	2 57 03.5	17.052
09	10 52 22.22	2.1459	10 11 48.1	15.957	09	12 33 45.89	2.1129	3 14 06.3	17.038
10	10 54 30.89	2.1432	9 55 48.9	16.015	10	12 35 52.71	2.1144	3 31 08.1	17.023
11	10 56 39.40	2.1406	9 39 46.3	16.072	11	12 37 59.62	2.1160	3 48 09.0	17.006
12	10 58 47.76	2.1380	9 23 40.3	16.127	12	12 40 06.63	2.1177	4 05 08.8	16.987
13	11 00 55.96	2.1355	9 07 31.1	16.180	13	12 42 13.74	2.1194	4 22 07.4	16.967
14	11 03 04.02	2.1332	8 51 18.7	16.232	14	12 44 20.96	2.1213	4 39 04.8	16.946
15	11 05 11.94	2.1308	8 35 03.3	16.282	15	12 46 28.30	2.1233	4 56 00.9	16.923
16	11 07 19.72	2.1286	8 18 44.9	16.332	16	12 48 35.75	2.1253	5 12 55.5	16.898
17	11 09 27.37	2.1264	8 02 23.5	16.379	17	12 50 43.33	2.1274	5 29 48.6	16.871
18	11 11 34.89	2.1243	7 45 59.4	16.424	18	12 52 51.04	2.1296	5 46 40.0	16.843
19	11 13 42.29	2.1224	7 29 32.6	16.469	19	12 54 58.88	2.1318	6 03 29.7	16.813
20	11 15 49.58	2.1205	7 13 03.1	16.513	20	12 57 06.86	2.1342	6 20 17.6	16.782
21	11 17 56.75	2.1187	6 56 31.1	16.553	21	12 59 14.99	2.1367	6 37 03.5	16.748
22	11 20 03.82	2.1170	6 39 56.7	16.593	22	13 01 23.26	2.1392	6 53 47.3	16.713
23	11 22 10.79	2.1153	+ 6 23 19.9	-16.633	23	13 03 31.69	2.1418	- 7 10 29.1	-16.678
Tuesday, May 26.					Thursday, May 28.				
00	11 24 17.66	2.1138	+ 6 06 40.8	-16.670	00	13 05 40.27	2.1444	- 7 27 08.6	-16.639
01	11 26 24.44	2.1123	5 49 59.5	16.705	01	13 07 49.02	2.1472	7 43 45.8	16.599
02	11 28 31.14	2.1109	5 33 16.2	16.738	02	13 09 57.94	2.1501	8 00 20.5	16.558
03	11 30 37.75	2.1097	5 16 30.9	16.772	03	13 12 07.03	2.1530	8 16 52.7	16.515
04	11 32 44.30	2.1085	4 59 43.6	16.803	04	13 14 16.30	2.1560	8 33 22.3	16.470
05	11 34 50.77	2.1074	4 42 54.6	16.832	05	13 16 25.75	2.1591	8 49 49.1	16.424
06	11 36 57.19	2.1064	4 26 03.8	16.860	06	13 18 35.39	2.1623	9 06 13.2	16.377
07	11 39 03.54	2.1054	4 09 11.4	16.887	07	13 20 45.23	2.1656	9 22 34.3	16.326
08	11 41 09.84	2.1046	3 52 17.4	16.912	08	13 22 55.26	2.1688	9 38 52.3	16.274
09	11 43 16.09	2.1038	3 35 22.0	16.935	09	13 25 05.49	2.1722	9 55 07.2	16.222
10	11 45 22.30	2.1032	3 18 25.2	16.958	10	13 27 15.92	2.1757	10 11 18.9	16.168
11	11 47 28.47	2.1026	3 01 27.1	16.978	11	13 29 26.57	2.1793	10 27 27.3	16.111
12	11 49 34.61	2.1021	2 44 27.9	16.996	12	13 31 37.43	2.1828	10 43 32.2	16.053
13	11 51 40.72	2.1018	2 27 27.6	17.014	13	13 33 48.51	2.1865	10 59 33.6	15.993
14	11 53 46.82	2.1015	2 10 26.2	17.031	14	13 35 59.81	2.1903	11 15 31.4	15.932
15	11 55 52.90	2.1012	1 53 23.9	17.044	15	13 38 11.34	2.1941	11 31 25.4	15.868
16	11 57 58.96	2.1011	1 36 20.9	17.057	16	13 40 23.10	2.1979	11 47 15.6	15.803
17	12 00 05.03	2.1011	1 19 17.1	17.069	17	13 42 35.09	2.2018	12 03 01.8	15.736
18	12 02 11.09	2.1011	1 02 12.6	17.078	18	13 44 47.32	2.2059	12 18 43.9	15.668
19	12 04 17.16	2.1013	0 45 07.7	17.086	19	13 46 59.80	2.2100	12 34 22.0	15.598
20	12 06 23.25	2.1016	0 28 02.3	17.093	20	13 49 12.52	2.2141	12 49 55.7	15.526
21	12 08 29.35	2.1018	+ 0 10 56.5	17.098	21	13 51 25.49	2.2183	13 05 25.1	15.453
22	12 10 35.47	2.1022	- 0 06 09.5	17.102	22	13 53 38.71	2.2225	13 20 50.1	15.378
23	12 12 41.62	2.1028	0 23 15.7	17.104	23	13 55 52.19	2.2268	13 36 10.5	15.301
24	12 14 47.81	2.1034	- 0 40 22.0	-17.104	24	13 58 05.93	2.2312	-13 51 26.2	-15.223

MOON, 1931.

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THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Friday, May 29.					Sunday, May 31.				
00	13 58 05.93	2.2312	-13 51 26.2	-15.223	00	15 50 46.39	2.4635	-23 59 41.8	-9.511
01	14 00 19.93	2.2356	14 06 37.2	15.143	01	15 53 14.33	2.4678	24 09 07.8	9.356
02	14 02 34.20	2.2400	14 21 43.3	15.060	02	15 55 42.52	2.4720	24 18 24.5	9.199
03	14 04 48.73	2.2445	14 36 44.4	14.976	03	15 58 10.97	2.4761	24 27 31.7	9.041
04	14 07 03.54	2.2491	14 51 40.4	14.891	04	16 00 39.65	2.4801	24 36 29.4	8.883
05	14 09 18.62	2.2537	15 06 31.3	14.804	05	16 03 08.58	2.4841	24 45 17.6	8.723
06	14 11 33.98	2.2583	15 21 16.9	14.715	06	16 05 37.74	2.4879	24 53 56.1	8.561
07	14 13 49.62	2.2630	15 35 57.1	14.624	07	16 08 07.13	2.4917	25 02 24.9	8.399
08	14 16 05.54	2.2678	15 50 31.8	14.532	08	16 10 36.74	2.4953	25 10 44.0	8.236
09	14 18 21.75	2.2726	16 05 00.9	14.438	09	16 13 06.57	2.4989	25 18 53.2	8.071
10	14 20 38.25	2.2773	16 19 24.3	14.343	10	16 15 36.61	2.5024	25 26 52.5	7.906
11	14 22 55.03	2.2822	16 33 42.0	14.245	11	16 18 06.86	2.5058	25 34 41.9	7.740
12	14 25 12.11	2.2871	16 47 53.7	14.146	12	16 20 37.31	2.5091	25 42 21.3	7.573
13	14 27 29.48	2.2919	17 01 59.5	14.045	13	16 23 07.95	2.5123	25 49 50.6	7.404
14	14 29 47.14	2.2968	17 15 59.1	13.942	14	16 25 38.79	2.5154	25 57 09.8	7.235
15	14 32 05.10	2.3019	17 29 52.5	13.838	15	16 28 09.80	2.5183	26 04 18.8	7.066
16	14 34 23.37	2.3069	17 43 39.7	13.733	16	16 30 40.99	2.5213	26 11 17.7	6.895
17	14 36 41.93	2.3118	17 57 20.4	13.624	17	16 33 12.35	2.5240	26 18 06.2	6.723
18	14 39 00.79	2.3168	18 10 54.6	13.516	18	16 35 43.87	2.5266	26 24 44.4	6.551
19	14 41 19.95	2.3219	18 24 22.3	13.405	19	16 38 15.54	2.5291	26 31 12.3	6.379
20	14 43 39.42	2.3270	18 37 43.2	13.292	20	16 40 47.36	2.5314	26 37 29.9	6.205
21	14 45 59.19	2.3320	18 50 57.3	13.178	21	16 43 19.31	2.5337	26 43 36.9	6.030
22	14 48 19.26	2.3371	19 04 04.6	13.063	22	16 45 51.40	2.5358	26 49 33.5	5.856
23	14 50 39.64	2.3423	-19 17 04.8	-12.945	23	16 48 23.61	2.5378	-26 55 19.6	-5.680
Saturday, May 30.					Monday, June 1.				
00	14 53 00.33	2.3473	-19 29 58.0	-12.827	00	16 50 55.94	2.5398	-27 00 55.1	-5.504
01	14 55 21.32	2.3524	19 42 44.0	12.705	01	16 53 28.38	2.5415	27 06 20.1	5.328
02	14 57 42.62	2.3575	19 55 22.6	12.583	02	16 56 00.92	2.5430	27 11 34.4	5.150
03	15 00 04.22	2.3626	20 07 53.9	12.459	03	16 58 33.54	2.5445	27 16 38.1	4.973
04	15 02 26.13	2.3678	20 20 17.7	12.333	04	17 01 06.26	2.5459	27 21 31.1	4.794
05	15 04 48.35	2.3728	20 32 33.9	12.206	05	17 03 39.05	2.5470	27 26 13.4	4.617
06	15 07 10.87	2.3778	20 44 42.4	12.078	06	17 06 11.90	2.5480	27 30 45.1	4.438
07	15 09 33.69	2.3828	20 56 43.2	11.948	07	17 08 44.81	2.5489	27 35 06.0	4.259
08	15 11 56.81	2.3878	21 08 36.1	11.816	08	17 11 17.77	2.5497	27 39 16.2	4.080
09	15 14 20.23	2.3929	21 20 21.1	11.683	09	17 13 50.77	2.5503	27 43 15.6	3.901
10	15 16 43.96	2.3979	21 31 58.0	11.548	10	17 16 23.80	2.5507	27 47 04.3	3.721
11	15 19 07.98	2.4028	21 43 26.8	11.412	11	17 18 56.85	2.5510	27 50 42.1	3.541
12	15 21 32.30	2.4078	21 54 47.4	11.274	12	17 21 29.92	2.5512	27 54 09.2	3.362
13	15 23 56.91	2.4127	22 05 59.7	11.134	13	17 24 02.99	2.5512	27 57 25.5	3.182
14	15 26 21.82	2.4176	22 17 03.5	10.993	14	17 26 36.06	2.5510	28 00 31.0	3.002
15	15 28 47.02	2.4223	22 27 58.9	10.852	15	17 29 09.11	2.5507	28 03 25.7	2.821
16	15 31 12.50	2.4271	22 38 45.7	10.708	16	17 31 42.14	2.5503	28 06 09.5	2.641
17	15 33 38.27	2.4319	22 49 23.9	10.563	17	17 34 15.14	2.5497	28 08 42.6	2.462
18	15 36 04.33	2.4366	22 59 53.3	10.417	18	17 36 48.10	2.5488	28 11 04.9	2.282
19	15 38 30.66	2.4412	23 10 13.9	10.269	19	17 39 21.00	2.5479	28 13 16.4	2.102
20	15 40 57.27	2.4458	23 20 25.6	10.120	20	17 41 53.85	2.5469	28 15 17.1	1.923
21	15 43 24.15	2.4503	23 30 28.3	9.970	21	17 44 26.63	2.5457	28 17 07.1	1.744
22	15 45 51.30	2.4547	23 40 22.0	9.818	22	17 46 59.33	2.5443	28 18 46.4	1.564
23	15 48 18.71	2.4591	23 50 06.5	9.665	23	17 49 31.95	2.5428	28 20 14.8	1.385
24	15 50 46.39	2.4635	-23 59 41.8	-9.511	24	17 52 04.47	2.5412	-28 21 32.6	-1.207

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Tuesday, June 2.					Thursday, June 4.				
00	17 52 04.47	2.5412	-28 21 32.6	-1.207	00	19 49 35.32	2.3145	-26 07 03.4	+6.429
01	17 54 36.89	2.5393	28 22 39.6	1.028	01	19 51 53.99	2.3077	26 00 33.7	6.560
02	17 57 09.19	2.5373	28 23 36.0	0.851	02	19 54 12.24	2.3008	25 53 56.2	6.689
03	17 59 41.37	2.5352	28 24 21.7	0.673	03	19 56 30.09	2.2940	25 47 11.0	6.818
04	18 02 13.41	2.5329	28 24 56.8	0.498	04	19 58 47.52	2.2871	25 40 18.0	6.946
05	18 04 45.32	2.5305	28 25 21.4	0.321	05	20 01 04.54	2.2803	25 33 17.5	7.071
06	18 07 17.07	2.5279	28 25 35.3	-0.144	06	20 03 21.15	2.2733	25 26 09.5	7.196
07	18 09 48.67	2.5253	28 25 38.7	+0.031	07	20 05 37.34	2.2663	25 18 54.0	7.319
08	18 12 20.10	2.5224	28 25 31.6	0.206	08	20 07 53.11	2.2593	25 11 31.2	7.441
09	18 14 51.36	2.5194	28 25 14.0	0.380	09	20 10 08.46	2.2523	25 04 01.1	7.562
10	18 17 22.43	2.5163	28 24 46.0	0.553	10	20 12 23.39	2.2453	24 56 23.8	7.681
11	18 19 53.31	2.5130	28 24 07.6	0.726	11	20 14 37.90	2.2383	24 48 39.4	7.798
12	18 22 23.99	2.5096	28 23 18.9	0.898	12	20 16 51.99	2.2313	24 40 48.0	7.914
13	18 24 54.46	2.5060	28 22 19.9	1.069	13	20 19 05.66	2.2243	24 32 49.7	8.029
14	18 27 24.71	2.5023	28 21 10.6	1.241	14	20 21 18.90	2.2172	24 24 44.5	8.143
15	18 29 54.73	2.4985	28 19 51.0	1.410	15	20 23 31.72	2.2102	24 16 32.5	8.256
16	18 32 24.53	2.4946	28 18 21.4	1.578	16	20 25 44.12	2.2031	24 08 13.8	8.367
17	18 34 54.08	2.4904	28 16 41.6	1.748	17	20 27 56.09	2.1961	23 59 48.5	8.476
18	18 37 23.38	2.4863	28 14 51.7	1.914	18	20 30 07.65	2.1891	23 51 16.7	8.584
19	18 39 52.43	2.4819	28 12 51.9	2.081	19	20 32 18.78	2.1820	23 42 38.4	8.692
20	18 42 21.21	2.4775	28 10 42.0	2.247	20	20 34 29.49	2.1750	23 33 53.7	8.797
21	18 44 49.73	2.4729	28 08 22.3	2.410	21	20 36 39.78	2.1680	23 25 02.8	8.901
22	18 47 17.96	2.4683	28 05 52.8	2.574	22	20 38 49.65	2.1610	23 16 05.6	9.005
23	18 49 45.92	2.4635	-28 03 13.4	+2.738	23	20 40 59.10	2.1540	-23 07 02.2	+9.107
Wednesday, June 3.					Friday, June 5.				
00	18 52 13.58	2.4586	-28 00 24.3	+2.898	00	20 43 08.13	2.1471	-22 57 52.8	+9.207
01	18 54 40.95	2.4536	27 57 25.6	3.059	01	20 45 16.75	2.1402	22 48 37.4	9.306
02	18 57 08.01	2.4483	27 54 17.2	3.219	02	20 47 24.95	2.1332	22 39 16.1	9.403
03	18 59 34.75	2.4431	27 50 59.3	3.378	03	20 49 32.73	2.1263	22 29 49.0	9.500
04	19 02 01.18	2.4378	27 47 31.9	3.535	04	20 51 40.11	2.1195	22 20 16.1	9.595
05	19 04 27.29	2.4324	27 43 55.1	3.691	05	20 53 47.07	2.1127	22 10 37.6	9.689
06	19 06 53.07	2.4269	27 40 09.0	3.846	06	20 55 53.63	2.1059	22 00 53.4	9.782
07	19 09 18.52	2.4213	27 36 13.6	4.000	07	20 57 59.78	2.0991	21 51 03.8	9.873
08	19 11 43.63	2.4156	27 32 09.0	4.153	08	21 00 05.52	2.0923	21 41 08.6	9.964
09	19 14 08.39	2.4098	27 27 55.2	4.305	09	21 02 10.86	2.0857	21 31 08.1	10.053
10	19 16 32.80	2.4039	27 23 32.4	4.455	10	21 04 15.80	2.0790	21 21 02.3	10.140
11	19 18 56.86	2.3979	27 19 00.6	4.604	11	21 06 20.34	2.0723	21 10 51.3	10.227
12	19 21 20.55	2.3918	27 14 19.9	4.752	12	21 08 24.48	2.0658	21 00 35.1	10.313
13	19 23 43.88	2.3858	27 09 30.4	4.899	13	21 10 28.23	2.0593	20 50 13.8	10.396
14	19 26 06.84	2.3796	27 04 32.0	5.045	14	21 12 31.59	2.0527	20 39 47.6	10.478
15	19 28 29.43	2.3733	26 59 25.0	5.188	15	21 14 34.55	2.0463	20 29 16.4	10.561
16	19 30 51.64	2.3670	26 54 09.4	5.332	16	21 16 37.14	2.0399	20 18 40.3	10.642
17	19 33 13.47	2.3606	26 48 45.2	5.473	17	21 18 39.34	2.0334	20 07 59.4	10.720
18	19 35 34.91	2.3542	26 43 12.6	5.613	18	21 20 41.15	2.0272	19 57 13.9	10.798
19	19 37 55.97	2.3477	26 37 31.6	5.753	19	21 22 42.60	2.0209	19 46 23.6	10.876
20	19 40 16.63	2.3412	26 31 42.2	5.891	20	21 24 43.66	2.0147	19 35 28.8	10.952
21	19 42 36.91	2.3346	26 25 44.7	6.027	21	21 26 44.36	2.0085	19 24 29.4	11.027
22	19 44 56.78	2.3278	26 19 39.0	6.163	22	21 28 44.68	2.0023	19 13 25.6	11.099
23	19 47 16.25	2.3212	26 13 25.2	6.297	23	21 30 44.64	1.9963	19 02 17.5	11.172
24	19 49 35.32	2.3145	-26 07 03.4	+6.429	24	21 32 44.24	1.9903	-18 51 05.0	+11.243

MOON, 1931.

III

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Saturday, June 6.					Monday, June 8.				
00	21 32 44.24	1.9903	-18 51 05.0	+11.243	00	23 02 35.69	1.7812	-8 47 56.9	+13.548
01	21 34 43.48	1.9844	18 39 48.3	11.314	01	23 04 22.48	1.7786	8 34 23.1	13.577
02	21 36 42.37	1.9785	18 28 27.3	11.383	02	23 06 09.12	1.7762	8 20 47.7	13.603
03	21 38 40.90	1.9727	18 17 02.3	11.451	03	23 07 55.62	1.7738	8 07 10.7	13.630
04	21 40 39.09	1.9669	18 05 33.2	11.518	04	23 09 41.98	1.7715	7 53 32.1	13.656
05	21 42 36.93	1.9612	17 54 00.1	11.584	05	23 11 28.20	1.7693	7 39 52.0	13.681
06	21 44 34.43	1.9556	17 42 23.1	11.649	06	23 13 14.29	1.7671	7 26 10.4	13.705
07	21 46 31.60	1.9500	17 30 42.2	11.713	07	23 15 00.25	1.7650	7 12 27.4	13.729
08	21 48 28.43	1.9444	17 18 57.5	11.777	08	23 16 46.09	1.7630	6 58 42.9	13.753
09	21 50 24.93	1.9390	17 07 09.0	11.838	09	23 18 31.81	1.7611	6 44 57.1	13.775
10	21 52 21.11	1.9336	16 55 16.9	11.898	10	23 20 17.42	1.7593	6 31 09.9	13.797
11	21 54 16.96	1.9283	16 43 21.2	11.958	11	23 22 02.92	1.7575	6 17 21.5	13.818
12	21 56 12.50	1.9230	16 31 21.9	12.018	12	23 23 48.32	1.7558	6 03 31.8	13.838
13	21 58 07.72	1.9178	16 19 19.1	12.075	13	23 25 33.62	1.7543	5 49 40.9	13.858
14	22 00 02.63	1.9127	16 07 12.9	12.132	14	23 27 18.83	1.7528	5 35 48.8	13.877
15	22 01 57.24	1.9076	15 55 03.3	12.188	15	23 29 03.95	1.7513	5 21 55.7	13.895
16	22 03 51.54	1.9026	15 42 50.3	12.243	16	23 30 48.98	1.7499	5 08 01.4	13.913
17	22 05 45.55	1.8977	15 30 34.1	12.297	17	23 32 33.94	1.7487	4 54 06.1	13.930
18	22 07 39.26	1.8928	15 18 14.7	12.350	18	23 34 18.82	1.7474	4 40 09.8	13.947
19	22 09 32.69	1.8881	15 05 52.1	12.403	19	23 36 03.63	1.7463	4 26 12.5	13.963
20	22 11 25.83	1.8833	14 53 26.4	12.453	20	23 37 48.37	1.7453	4 12 14.3	13.978
21	22 13 18.68	1.8786	14 40 57.7	12.504	21	23 39 33.06	1.7443	3 58 15.2	13.993
22	22 15 11.26	1.8741	14 28 25.9	12.553	22	23 41 17.69	1.7434	3 44 15.2	14.006
23	22 17 03.57	1.8696	-14 15 51.3	+12.602	23	23 43 02.27	1.7426	-3 30 14.5	+14.018
Sunday, June 7.					Tuesday, June 9.				
00	22 18 55.61	1.8652	-14 03 13.7	+12.650	00	23 44 46.80	1.7418	-3 16 13.0	+14.032
01	22 20 47.39	1.8608	13 50 33.3	12.697	01	23 46 31.29	1.7412	3 02 10.7	14.043
02	22 22 38.91	1.8565	13 37 50.1	12.743	02	23 48 15.74	1.7406	2 48 07.8	14.054
03	22 24 30.17	1.8523	13 25 04.2	12.787	03	23 50 00.16	1.7402	2 34 04.2	14.065
04	22 26 21.18	1.8482	13 12 15.7	12.831	04	23 51 44.56	1.7398	2 20 00.0	14.075
05	22 28 11.95	1.8441	12 59 24.5	12.875	05	23 53 28.93	1.7394	2 05 55.2	14.084
06	22 30 02.47	1.8401	12 46 30.7	12.918	06	23 55 13.29	1.7392	1 51 49.9	14.093
07	22 31 52.76	1.8362	12 33 34.4	12.959	07	23 56 57.63	1.7389	1 37 44.1	14.101
08	22 33 42.81	1.8323	12 20 35.6	13.000	08	23 58 41.96	1.7388	1 23 37.8	14.108
09	22 35 32.63	1.8286	12 07 34.4	13.040	09	00 00 26.29	1.7389	1 09 31.1	14.115
10	22 37 22.24	1.8249	11 54 30.8	13.079	10	00 02 10.63	1.7389	0 55 24.0	14.122
11	22 39 11.62	1.8212	11 41 24.9	13.118	11	00 03 54.96	1.7390	0 41 16.5	14.128
12	22 41 00.78	1.8177	11 28 16.7	13.156	12	00 05 39.31	1.7393	0 27 08.7	14.132
13	22 42 49.74	1.8143	11 15 06.2	13.193	13	00 07 23.67	1.7396	-0 13 00.7	14.136
14	22 44 38.49	1.8108	11 01 53.6	13.228	14	00 09 08.06	1.7400	+0 01 07.6	14.140
15	22 46 27.04	1.8075	10 48 38.8	13.263	15	00 10 52.47	1.7403	0 15 16.1	14.143
16	22 48 15.39	1.8043	10 35 22.0	13.298	16	00 12 36.90	1.7409	0 29 24.7	14.145
17	22 50 03.55	1.8011	10 22 03.0	13.333	17	00 14 21.38	1.7416	0 43 33.5	14.147
18	22 51 51.52	1.7980	10 08 42.1	13.365	18	00 16 05.89	1.7423	0 57 42.3	14.147
19	22 53 39.31	1.7951	9 55 19.2	13.398	19	00 17 50.45	1.7430	1 11 51.1	14.148
20	22 55 26.93	1.7922	9 41 54.4	13.429	20	00 19 35.05	1.7438	1 26 00.0	14.148
21	22 57 14.37	1.7893	9 28 27.7	13.460	21	00 21 19.71	1.7448	1 40 08.8	14.146
22	22 59 01.64	1.7864	9 14 59.2	13.490	22	00 23 04.43	1.7459	1 54 17.5	14.144
23	23 00 48.74	1.7838	9 01 28.9	13.519	23	00 24 49.22	1.7470	2 08 26.1	14.142
24	23 02 35.69	1.7812	-8 47 56.9	+13.548	24	00 26 34.07	1.7482	+2 22 34.5	+14.138

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Wednesday, June 10.					Friday, June 12.				
00	^h 00 ^m 26 ^s 34.07	1.7482	+ 2 22 34.5	+14.138	00	^h 01 ^m 53 ^s 20.70	1.8978	+13 23 43.0	+13.095
01	00 28 19.00	1.7494	2 36 42.7	14.135	01	01 55 14.71	1.9028	13 36 47.4	13.052
02	00 30 04.00	1.7507	2 50 50.7	14.131	02	01 57 09.03	1.9078	13 49 49.2	13.008
03	00 31 49.08	1.7522	3 04 58.4	14.125	03	01 59 03.65	1.9130	14 02 48.3	12.962
04	00 33 34.26	1.7537	3 19 05.7	14.119	04	02 00 58.59	1.9183	14 15 44.6	12.915
05	00 35 19.52	1.7552	3 33 12.7	14.113	05	02 02 53.84	1.9235	14 28 38.1	12.868
06	00 37 04.88	1.7568	3 47 19.3	14.106	06	02 04 49.41	1.9289	14 41 28.7	12.819
07	00 38 50.34	1.7586	4 01 25.4	14.098	07	02 06 45.31	1.9343	14 54 16.4	12.770
08	00 40 35.91	1.7604	4 15 31.1	14.089	08	02 08 41.53	1.9398	15 07 01.1	12.718
09	00 42 21.59	1.7623	4 29 36.1	14.079	09	02 10 38.09	1.9454	15 19 42.6	12.666
10	00 44 07.39	1.7643	4 43 40.6	14.070	10	02 12 34.98	1.9510	15 32 21.0	12.613
11	00 45 53.31	1.7663	4 57 44.5	14.059	11	02 14 32.21	1.9568	15 44 56.2	12.559
12	00 47 39.35	1.7684	5 11 47.7	14.048	12	02 16 29.79	1.9625	15 57 28.1	12.504
13	00 49 25.52	1.7707	5 25 50.2	14.036	13	02 18 27.71	1.9683	16 09 56.7	12.448
14	00 51 11.83	1.7730	5 39 52.0	14.023	14	02 20 25.99	1.9743	16 22 21.8	12.389
15	00 52 58.28	1.7754	5 53 52.9	14.009	15	02 22 24.62	1.9803	16 34 43.4	12.330
16	00 54 44.88	1.7778	6 07 53.1	13.995	16	02 24 23.62	1.9863	16 47 01.4	12.271
17	00 56 31.62	1.7803	6 21 52.3	13.979	17	02 26 22.97	1.9923	16 59 15.9	12.209
18	00 58 18.52	1.7830	6 35 50.6	13.963	18	02 28 22.70	1.9986	17 11 26.5	12.147
19	01 00 05.58	1.7857	6 49 47.9	13.947	19	02 30 22.80	2.0048	17 24 21.8	12.083
20	01 01 52.80	1.7884	7 03 44.2	13.929	20	02 32 23.27	2.0110	17 35 36.5	12.018
21	01 03 40.19	1.7913	7 17 39.4	13.911	21	02 34 24.12	2.0173	17 47 35.6	11.952
22	01 05 27.76	1.7943	7 31 33.5	13.893	22	02 36 25.35	2.0238	17 59 30.7	11.884
23	01 07 15.50	1.7972	+ 7 45 26.5	+13.873	23	02 38 26.97	2.0302	+18 11 21.7	+11.816
Thursday, June 11.					Saturday, June 13.				
00	01 09 03.42	1.8003	+ 7 59 18.2	+13.852	00	02 40 28.97	2.0367	+18 23 08.6	+11.746
01	01 10 51.53	1.8035	8 13 08.7	13.830	01	02 42 31.37	2.0433	18 34 51.2	11.674
02	01 12 39.84	1.8068	8 26 57.8	13.808	02	02 44 34.16	2.0498	18 46 29.5	11.602
03	01 14 28.34	1.8100	8 40 45.6	13.785	03	02 46 37.35	2.0565	18 58 03.4	11.528
04	01 16 17.04	1.8134	8 54 32.0	13.761	04	02 48 40.94	2.0633	19 09 32.9	11.453
05	01 18 05.95	1.8169	9 08 16.9	13.737	05	02 50 44.94	2.0700	19 20 57.8	11.376
06	01 19 55.07	1.8205	9 22 00.4	13.711	06	02 52 49.34	2.0768	19 32 18.0	11.298
07	01 21 44.41	1.8242	9 35 42.2	13.684	07	02 54 54.15	2.0837	19 43 33.6	11.219
08	01 23 33.97	1.8278	9 49 22.5	13.658	08	02 56 59.38	2.0906	19 54 44.3	11.138
09	01 25 23.75	1.8317	10 03 01.1	13.628	09	02 59 05.02	2.0975	20 05 50.2	11.057
10	01 27 13.77	1.8355	10 16 37.9	13.599	10	03 01 11.08	2.1045	20 16 51.1	10.973
11	01 29 04.01	1.8394	10 30 13.0	13.570	11	03 03 17.56	2.1115	20 27 47.0	10.888
12	01 30 54.50	1.8435	10 43 46.3	13.539	12	03 05 24.46	2.1186	20 38 37.7	10.802
13	01 32 45.23	1.8476	10 57 17.7	13.508	13	03 07 31.79	2.1257	20 49 23.2	10.715
14	01 34 36.21	1.8518	11 10 47.2	13.474	14	03 09 39.54	2.1328	21 00 03.5	10.627
15	01 36 27.45	1.8561	11 24 14.6	13.441	15	03 11 47.72	2.1399	21 10 38.4	10.536
16	01 38 18.94	1.8603	11 37 40.1	13.407	16	03 13 56.33	2.1472	21 21 07.8	10.444
17	01 40 10.69	1.8648	11 51 03.4	13.371	17	03 16 05.38	2.1544	21 31 31.7	10.351
18	01 42 02.71	1.8693	12 04 24.6	13.334	18	03 18 14.86	2.1616	21 41 49.9	10.256
19	01 43 55.01	1.8738	12 17 43.5	13.297	19	03 20 24.77	2.1688	21 52 02.4	10.160
20	01 45 47.57	1.8784	12 31 00.2	13.259	20	03 22 35.12	2.1762	22 02 09.1	10.063
21	01 47 40.42	1.8833	12 44 14.6	13.219	21	03 24 45.91	2.1835	22 12 09.9	9.963
22	01 49 33.56	1.8880	12 57 26.5	13.178	22	03 26 57.14	2.1908	22 22 04.7	9.863
23	01 51 26.98	1.8928	13 10 36.0	13.138	23	03 29 08.81	2.1982	22 31 53.5	9.762
24	01 53 20.70	1.8978	+13 23 43.0	+13.095	24	03 31 20.92	2.2055	+22 41 36.1	+ 9.658

MOON, 1931.

II3

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Sunday, June 14.					Tuesday, June 16.				
00	h m s	s	° ' "	"	00	h m s	s	° ' "	"
01	03 31 20.92	2.2055	+22 41 36.1	+9.658	01	05 25 17.39	2.5195	+27 57 59.6	+2.988
02	03 33 33.47	2.2128	22 51 12.5	9.553	02	05 27 48.70	2.5239	28 00 53.8	2.818
03	03 35 46.46	2.2203	23 00 42.5	9.447	03	05 30 20.26	2.5283	28 03 37.8	2.647
04	03 37 59.90	2.2277	23 10 06.1	9.338	04	05 32 52.09	2.5325	28 06 11.4	2.474
05	03 40 13.78	2.2351	23 19 23.1	9.229	05	05 35 24.16	2.5366	28 08 34.7	2.301
06	03 42 28.11	2.2425	23 28 33.6	9.118	06	05 37 56.48	2.5405	28 10 47.5	2.127
07	03 44 42.88	2.2498	23 37 37.3	9.006	07	05 40 29.02	2.5442	28 12 49.9	1.953
08	03 46 58.09	2.2572	23 46 34.3	8.893	08	05 43 01.78	2.5478	28 14 41.8	1.777
09	03 49 13.74	2.2646	23 55 24.4	8.777	09	05 45 34.76	2.5513	28 16 23.1	1.600
10	03 51 29.84	2.2719	24 04 07.5	8.660	10	05 48 07.94	2.5547	28 17 53.8	1.423
11	03 53 46.37	2.2793	24 12 43.6	8.542	11	05 50 41.32	2.5578	28 19 13.8	1.245
12	03 56 03.35	2.2867	24 21 12.5	8.422	12	05 53 14.88	2.5608	28 20 23.2	1.067
13	03 58 20.77	2.2940	24 29 34.2	8.301	13	05 55 48.62	2.5638	28 21 21.8	0.888
14	04 00 38.63	2.3013	24 37 48.6	8.178	14	05 58 22.53	2.5665	28 22 09.7	0.708
15	04 02 56.92	2.3086	24 45 55.5	8.053	15	06 00 56.60	2.5690	28 22 46.7	0.527
16	04 05 15.66	2.3158	24 53 55.0	7.928	16	06 03 30.81	2.5714	28 23 12.9	0.346
17	04 07 34.82	2.3230	25 01 46.8	7.800	17	06 06 05.17	2.5737	28 23 28.2	+0.164
18	04 09 54.42	2.3303	25 09 31.0	7.671	18	06 08 39.65	2.5757	28 23 32.6	-0.018
19	04 12 14.45	2.3374	25 17 07.3	7.540	19	06 11 14.25	2.5776	28 23 26.1	0.199
20	04 14 34.91	2.3445	25 24 35.8	7.409	20	06 13 48.96	2.5793	28 23 08.7	0.382
21	04 16 55.79	2.3515	25 31 56.4	7.276	21	06 16 23.77	2.5810	28 22 40.3	0.564
22	04 19 17.09	2.3586	25 39 08.9	7.140	22	06 18 58.68	2.5824	28 22 01.0	0.748
23	04 21 38.82	2.3656	25 46 13.2	7.004	23	06 21 33.66	2.5836	28 21 10.6	0.932
24	04 24 00.96	2.3725	+25 53 09.4	+6.867	24	06 24 08.71	2.5848	+28 20 09.2	-1.116
Monday, June 15.					Wednesday, June 17.				
00	h m s	s	° ' "	"	00	h m s	s	° ' "	"
01	04 26 23.52	2.3794	+25 59 57.2	+6.728	01	06 26 43.83	2.5858	+28 18 56.7	-1.301
02	04 28 46.49	2.3862	26 06 36.7	6.587	02	06 29 19.00	2.5864	28 17 33.1	1.485
03	04 31 09.86	2.3929	26 13 07.6	6.444	03	06 31 54.20	2.5870	28 15 58.5	1.668
04	04 33 33.64	2.3997	26 19 30.0	6.301	04	06 34 29.44	2.5874	28 14 12.9	1.853
05	04 35 57.82	2.4063	26 25 43.7	6.156	05	06 37 04.69	2.5877	28 12 16.2	2.037
06	04 38 22.39	2.4128	26 31 48.7	6.010	06	06 39 39.96	2.5878	28 10 08.5	2.220
07	04 40 47.36	2.4193	26 37 44.9	5.863	07	06 42 15.22	2.5877	28 07 49.8	2.404
08	04 43 12.71	2.4257	26 43 32.2	5.713	08	06 44 50.48	2.5875	28 05 20.0	2.589
09	04 45 38.44	2.4319	26 49 10.5	5.563	09	06 47 25.72	2.5871	28 02 39.1	2.773
10	04 48 04.54	2.4382	26 54 39.8	5.412	10	06 50 00.93	2.5865	27 59 47.2	2.957
11	04 50 31.02	2.4443	26 59 59.9	5.258	11	06 52 36.10	2.5858	27 56 44.3	3.142
12	04 52 57.86	2.4504	27 05 10.8	5.104	12	06 55 11.23	2.5850	27 53 30.2	3.327
13	04 55 25.07	2.4564	27 10 12.4	4.948	13	06 57 46.30	2.5839	27 50 05.1	3.509
14	04 57 52.63	2.4623	27 15 04.6	4.792	14	07 00 21.30	2.5828	27 46 29.1	3.691
15	05 00 20.54	2.4681	27 19 47.4	4.633	15	07 02 56.23	2.5814	27 42 42.2	3.874
16	05 02 48.80	2.4738	27 24 20.6	4.474	16	07 05 31.07	2.5799	27 38 44.2	4.057
17	05 05 17.39	2.4793	27 28 44.3	4.314	17	07 08 05.82	2.5783	27 34 35.4	4.238
18	05 07 46.31	2.4847	27 32 58.3	4.152	18	07 10 40.46	2.5764	27 30 15.7	4.419
19	05 10 15.55	2.4900	27 37 02.5	3.988	19	07 13 14.99	2.5746	27 25 45.1	4.600
20	05 12 45.11	2.4952	27 40 56.9	3.825	20	07 15 49.41	2.5725	27 21 03.7	4.780
21	05 15 14.97	2.5003	27 44 41.5	3.660	21	07 18 23.69	2.5702	27 16 11.5	4.960
22	05 17 45.14	2.5053	27 48 16.1	3.493	22	07 20 57.83	2.5678	27 11 08.5	5.139
23	05 20 15.61	2.5102	27 51 40.7	3.326	23	07 23 31.83	2.5653	27 05 54.8	5.318
24	05 22 46.36	2.5148	27 54 55.2	3.158	24	07 26 05.67	2.5627	27 00 30.4	5.496
	05 25 17.39	2.5195	+27 57 59.6	+2.988		07 28 39.35	2.5599	+26 54 55.3	-5.673

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Thursday, June 18.					Saturday, June 20.				
00	07 28 39.35	2.5599	+26 54 55.3	-5.673	00	09 26 28.95	2.3278	+19 19 00.5	-12.810
01	07 31 12.86	2.5569	26 49 09.6	5.849	01	09 28 48.45	2.3223	19 06 08.5	12.923
02	07 33 46.18	2.5538	26 43 13.4	6.024	02	09 31 07.62	2.3168	18 53 09.7	13.035
03	07 36 19.32	2.5508	26 37 06.7	6.199	03	09 33 26.46	2.3113	18 40 04.3	13.145
04	07 38 52.27	2.5474	26 30 49.5	6.373	04	09 35 44.97	2.3058	18 26 52.3	13.253
05	07 41 25.01	2.5440	26 24 21.9	6.546	05	09 38 03.15	2.3003	18 13 33.9	13.359
06	07 43 57.55	2.5404	26 17 44.0	6.718	06	09 40 21.00	2.2948	18 00 09.2	13.463
07	07 46 29.86	2.5368	26 10 55.8	6.889	07	09 42 38.53	2.2894	17 46 38.3	13.567
08	07 49 01.96	2.5331	26 03 57.3	7.059	08	09 44 55.73	2.2840	17 33 01.2	13.669
09	07 51 33.83	2.5292	25 56 48.7	7.228	09	09 47 12.61	2.2787	17 19 18.0	13.769
10	07 54 05.46	2.5252	25 49 30.0	7.397	10	09 49 29.17	2.2733	17 05 28.9	13.867
11	07 56 36.85	2.5211	25 42 01.1	7.564	11	09 51 45.41	2.2681	16 51 34.0	13.963
12	07 59 07.99	2.5169	25 34 22.3	7.729	12	09 54 01.34	2.2629	16 37 33.3	14.058
13	08 01 38.88	2.5127	25 26 33.6	7.894	13	09 56 16.96	2.2578	16 23 27.0	14.152
14	08 04 09.51	2.5083	25 18 35.0	8.058	14	09 58 32.27	2.2526	16 09 15.1	14.243
15	08 06 39.87	2.5038	25 10 26.6	8.221	15	10 00 47.27	2.2475	15 54 57.8	14.333
16	08 09 09.96	2.4992	25 02 08.5	8.383	16	10 03 01.97	2.2425	15 40 35.1	14.423
17	08 11 39.77	2.4946	24 53 40.7	8.543	17	10 05 16.37	2.2375	15 26 07.1	14.509
18	08 14 09.31	2.4899	24 45 03.4	8.701	18	10 07 30.47	2.2326	15 11 34.0	14.593
19	08 16 38.56	2.4851	24 36 16.6	8.859	19	10 09 44.28	2.2277	14 56 55.9	14.678
20	08 19 07.52	2.4803	24 27 20.3	9.016	20	10 11 57.79	2.2228	14 42 12.7	14.760
21	08 21 36.19	2.4753	24 18 14.7	9.171	21	10 14 11.02	2.2182	14 27 24.7	14.840
22	08 24 04.56	2.4703	24 08 59.8	9.324	22	10 16 23.97	2.2134	14 12 31.9	14.918
23	08 26 32.63	2.4653	+23 59 35.8	-9.477	23	10 18 36.63	2.2088	+13 57 34.5	-14.995
Friday, June 19.					Sunday, June 21.				
00	08 29 00.39	2.4601	+23 50 02.6	-9.628	00	10 20 49.02	2.2043	+13 42 32.5	-15.071
01	08 31 27.84	2.4549	23 40 20.4	9.778	01	10 23 01.14	2.1998	13 27 26.0	15.145
02	08 33 54.98	2.4498	23 30 29.3	9.926	02	10 25 12.99	2.1953	13 12 15.1	15.217
03	08 36 21.81	2.4445	23 20 29.3	10.073	03	10 27 24.57	2.1908	12 57 00.0	15.288
04	08 38 48.32	2.4391	23 10 20.5	10.219	04	10 29 35.89	2.1866	12 41 40.6	15.357
05	08 41 14.50	2.4338	23 00 03.0	10.363	05	10 31 46.96	2.1824	12 26 17.2	15.424
06	08 43 40.37	2.4283	22 49 37.0	10.505	06	10 33 57.78	2.1782	12 10 49.7	15.490
07	08 46 05.90	2.4229	22 39 02.4	10.647	07	10 36 08.34	2.1741	11 55 18.4	15.554
08	08 48 31.12	2.4175	22 28 19.4	10.786	08	10 38 18.67	2.1701	11 39 43.2	15.618
09	08 50 56.00	2.4119	22 17 28.1	10.924	09	10 40 28.75	2.1661	11 24 04.3	15.678
10	08 53 20.55	2.4063	22 06 28.5	11.062	10	10 42 38.60	2.1623	11 08 21.8	15.738
11	08 55 44.76	2.4008	21 55 20.7	11.197	11	10 44 48.23	2.1585	10 52 35.8	15.795
12	08 58 08.64	2.3953	21 44 04.9	11.330	12	10 46 57.62	2.1548	10 36 46.4	15.852
13	09 00 32.19	2.3897	21 32 41.1	11.462	13	10 49 06.80	2.1512	10 20 53.6	15.907
14	09 02 55.40	2.3840	21 21 09.5	11.592	14	10 51 15.76	2.1476	10 04 57.6	15.959
15	09 05 18.27	2.3784	21 09 30.1	11.721	15	10 53 24.51	2.1441	9 48 58.5	16.011
16	09 07 40.81	2.3728	20 57 43.0	11.849	16	10 55 33.05	2.1407	9 32 56.3	16.062
17	09 10 03.01	2.3672	20 45 48.2	11.975	17	10 57 41.39	2.1374	9 16 51.1	16.110
18	09 12 24.87	2.3615	20 33 46.0	12.098	18	10 59 49.54	2.1342	9 00 43.1	16.157
19	09 14 46.39	2.3559	20 21 36.4	12.221	19	11 01 57.49	2.1310	8 44 32.3	16.203
20	09 17 07.58	2.3503	20 09 19.5	12.343	20	11 04 05.26	2.1280	8 28 18.8	16.246
21	09 19 28.43	2.3447	19 56 55.3	12.463	21	11 06 12.85	2.1250	8 12 02.8	16.288
22	09 21 48.94	2.3390	19 44 24.0	12.580	22	11 08 20.26	2.1221	7 55 44.2	16.329
23	09 24 09.11	2.3334	19 31 45.7	12.696	23	11 10 27.50	2.1193	7 39 23.3	16.368
24	09 26 28.95	2.3278	+19 19 00.5	-12.810	24	11 12 34.57	2.1165	+7 23 00.0	-16.407

MOON, 1931.

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THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Monday, June 22.					Wednesday, June 24.				
00	11 12 34.57	2.1165	+ 7 23 00.0	-16.407	00	12 52 45.46	2.0930	- 5 59 49.9	-16.485
01	11 14 41.48	2.1139	7 06 34.5	16.443	01	12 54 51.09	2.0948	6 16 18.0	16.452
02	11 16 48.24	2.1114	6 50 06.9	16.477	02	12 56 56.83	2.0967	6 32 44.1	16.417
03	11 18 54.85	2.1089	6 33 37.3	16.510	03	12 59 02.69	2.0986	6 49 08.0	16.380
04	11 21 01.31	2.1065	6 17 05.7	16.542	04	13 01 08.66	2.1006	7 05 29.7	16.342
05	11 23 07.63	2.1043	6 00 32.3	16.572	05	13 03 14.76	2.1027	7 21 49.0	16.302
06	11 25 13.82	2.1021	5 43 57.1	16.601	06	13 05 20.98	2.1048	7 38 05.9	16.261
07	11 27 19.88	2.0999	5 27 20.2	16.628	07	13 07 27.34	2.1071	7 54 20.3	16.218
08	11 29 25.81	2.0979	5 10 41.7	16.653	08	13 09 33.83	2.1094	8 10 32.1	16.174
09	11 31 31.03	2.0961	4 54 01.8	16.678	09	13 11 40.47	2.1118	8 26 41.2	16.128
10	11 33 37.34	2.0942	4 37 20.4	16.701	10	13 13 47.25	2.1143	8 42 47.5	16.082
11	11 35 42.93	2.0924	4 20 37.7	16.722	11	13 15 54.19	2.1169	8 58 51.0	16.033
12	11 37 48.43	2.0908	4 03 53.8	16.742	12	13 18 01.28	2.1196	9 14 51.5	15.983
13	11 39 53.83	2.0893	3 47 08.7	16.760	13	13 20 08.54	2.1223	9 30 49.0	15.933
14	11 41 59.14	2.0878	3 30 22.6	16.777	14	13 22 15.96	2.1252	9 46 43.4	15.879
15	11 44 04.36	2.0864	3 13 35.5	16.793	15	13 24 23.56	2.1282	10 02 34.5	15.825
16	11 46 09.51	2.0852	2 56 47.5	16.807	16	13 26 31.34	2.1311	10 18 22.4	15.770
17	11 48 14.58	2.0839	2 39 58.7	16.819	17	13 28 39.29	2.1342	10 34 06.9	15.713
18	11 50 19.58	2.0828	2 23 09.2	16.830	18	13 30 47.44	2.1373	10 49 47.9	15.654
19	11 52 24.52	2.0818	2 06 19.1	16.839	19	13 32 55.77	2.1405	11 05 25.4	15.594
20	11 54 29.40	2.0810	1 49 28.5	16.847	20	13 35 04.30	2.1438	11 20 59.2	15.532
21	11 56 34.24	2.0802	1 32 37.5	16.854	21	13 37 13.02	2.1471	11 36 29.2	15.469
22	11 58 39.02	2.0793	1 15 46.0	16.859	22	13 39 21.95	2.1506	11 51 55.5	15.405
23	12 00 43.76	2.0788	+ 0 58 54.4	-16.863	23	13 41 31.09	2.1541	-12 07 17.8	-15.338
Tuesday, June 23.					Thursday, June 25.				
00	12 02 48.47	2.0783	+ 0 42 02.5	-16.865	00	13 43 40.44	2.1576	-12 22 36.1	-15.271
01	12 04 53.15	2.0778	0 25 10.6	16.866	01	13 45 50.00	2.1613	12 37 50.3	15.202
02	12 06 57.81	2.0774	+ 0 08 18.6	16.866	02	13 47 59.79	2.1650	12 53 00.3	15.132
03	12 09 02.44	2.0772	- 0 08 33.3	16.863	03	13 50 09.80	2.1688	13 08 06.1	15.060
04	12 11 07.07	2.0771	0 25 25.0	16.859	04	13 52 20.04	2.1727	13 23 07.5	14.986
05	12 13 11.69	2.0770	0 42 16.4	16.854	05	13 54 30.52	2.1765	13 38 04.4	14.911
06	12 15 16.31	2.0770	0 59 07.5	16.848	06	13 56 41.22	2.1804	13 52 56.8	14.835
07	12 17 20.93	2.0771	1 15 58.2	16.840	07	13 58 52.17	2.1845	14 07 44.6	14.757
08	12 19 25.56	2.0773	1 32 48.3	16.831	08	14 01 03.36	2.1886	14 22 27.6	14.678
09	12 21 30.20	2.0776	1 49 37.9	16.820	09	14 03 14.80	2.1927	14 37 05.9	14.597
10	12 23 34.87	2.0781	2 06 26.7	16.808	10	14 05 26.48	2.1968	14 51 39.2	14.513
11	12 25 39.57	2.0785	2 23 14.8	16.794	11	14 07 38.42	2.2012	15 06 07.5	14.430
12	12 27 44.29	2.0790	2 40 02.0	16.779	12	14 09 50.62	2.2055	15 20 30.8	14.345
13	12 29 49.05	2.0798	2 56 48.3	16.763	13	14 12 03.08	2.2098	15 34 48.9	14.258
14	12 31 53.86	2.0805	3 13 33.5	16.744	14	14 14 15.80	2.2142	15 49 01.7	14.169
15	12 33 58.71	2.0813	3 30 17.6	16.725	15	14 16 28.78	2.2187	16 03 09.2	14.079
16	12 36 03.62	2.0823	3 47 00.5	16.704	16	14 18 42.04	2.2233	16 17 11.2	13.988
17	12 38 08.58	2.0833	4 03 42.1	16.683	17	14 20 55.57	2.2278	16 31 07.8	13.895
18	12 40 13.61	2.0844	4 20 22.4	16.658	18	14 23 09.37	2.2323	16 44 58.6	13.800
19	12 42 18.71	2.0857	4 37 01.1	16.633	19	14 25 23.44	2.2369	16 58 43.8	13.705
20	12 44 23.89	2.0870	4 53 38.4	16.607	20	14 27 37.80	2.2417	17 12 23.2	13.608
21	12 46 29.15	2.0883	5 10 13.9	16.578	21	14 29 52.44	2.2463	17 25 56.7	13.508
22	12 48 34.49	2.0898	5 26 47.8	16.549	22	14 32 07.35	2.2510	17 39 24.2	13.408
23	12 50 39.93	2.0914	5 43 19.8	16.518	23	14 34 22.56	2.2558	17 52 45.7	13.307
24	12 52 45.46	2.0930	- 5 59 49.9	-16.485	24	14 36 38.05	2.2606	-18 06 01.0	-13.203

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Friday, June 26.					Sunday, June 28.				
00	^h 14 ^m 36 ^s 38.05	2.2606	—18 06 01.0	—13.203	00	^h 16 ^m 30 ^s 41.22	2.4788	—26 14 03.7	—6.645
01	14 38 53.83	2.2654	18 19 10.1	13.098	01	16 33 10.04	2.4819	26 20 37.5	6.481
02	14 41 09.90	2.2703	18 32 12.8	12.992	02	16 35 39.05	2.4849	26 27 01.4	6.315
03	14 43 26.26	2.2752	18 45 09.1	12.884	03	16 38 08.23	2.4878	26 33 15.3	6.149
04	14 45 42.92	2.2802	18 57 58.9	12.775	04	16 40 37.59	2.4907	26 39 19.3	5.983
05	14 47 59.88	2.2851	19 10 42.1	12.664	05	16 43 07.11	2.4933	26 45 13.3	5.815
06	14 50 17.13	2.2899	19 23 18.6	12.552	06	16 45 36.79	2.4959	26 50 57.1	5.647
07	14 52 34.67	2.2949	19 35 48.3	12.438	07	16 48 06.62	2.4984	26 56 30.9	5.479
08	14 54 52.52	2.2999	19 48 11.2	12.323	08	16 50 36.60	2.5008	27 01 54.6	5.310
09	14 57 10.66	2.3048	20 00 27.1	12.207	09	16 53 06.71	2.5030	27 07 08.1	5.139
10	14 59 29.10	2.3099	20 12 36.0	12.088	10	16 55 36.96	2.5052	27 12 11.3	4.969
11	15 01 47.85	2.3149	20 24 37.7	11.969	11	16 58 07.33	2.5071	27 17 04.4	4.798
12	15 04 06.89	2.3198	20 36 32.3	11.849	12	17 00 37.81	2.5089	27 21 47.1	4.626
13	15 06 26.23	2.3249	20 48 19.6	11.727	13	17 03 08.40	2.5107	27 26 19.5	4.455
14	15 08 45.88	2.3300	20 59 59.5	11.603	14	17 05 39.09	2.5123	27 30 41.7	4.283
15	15 11 05.83	2.3349	21 11 31.9	11.478	15	17 08 09.87	2.5138	27 34 53.4	4.109
16	15 13 26.07	2.3399	21 22 56.8	11.351	16	17 10 40.74	2.5151	27 38 54.8	3.937
17	15 15 46.62	2.3449	21 34 14.0	11.223	17	17 13 11.68	2.5162	27 42 45.8	3.763
18	15 18 07.46	2.3498	21 45 23.6	11.094	18	17 15 42.68	2.5173	27 46 26.3	3.588
19	15 20 28.60	2.3548	21 56 25.3	10.963	19	17 18 13.75	2.5182	27 49 56.4	3.415
20	15 22 50.04	2.3598	22 07 19.2	10.832	20	17 20 44.86	2.5189	27 53 16.1	3.241
21	15 25 11.77	2.3647	22 18 05.1	10.698	21	17 23 16.02	2.5196	27 56 25.3	3.067
22	15 27 33.80	2.3696	22 28 43.0	10.564	22	17 25 47.21	2.5201	27 59 24.1	2.892
23	15 29 56.12	2.3744	—22 39 12.8	—10.428	23	17 28 18.43	2.5205	—28 02 12.3	—2.716
Saturday, June 27.					Monday, June 29.				
00	15 32 18.73	2.3793	—22 49 34.4	—10.291	00	17 30 49.67	2.5207	—28 04 50.0	—2.542
01	15 34 41.63	2.3841	22 59 47.7	10.152	01	17 33 20.91	2.5207	28 07 17.3	2.367
02	15 37 04.82	2.3888	23 09 52.6	10.012	02	17 35 52.15	2.5207	28 09 34.0	2.191
03	15 39 28.29	2.3936	23 19 49.1	9.872	03	17 38 23.39	2.5204	28 11 40.2	2.016
04	15 41 52.05	2.3983	23 29 37.2	9.729	04	17 40 54.60	2.5199	28 13 35.9	1.841
05	15 44 16.09	2.4029	23 39 16.6	9.584	05	17 43 25.78	2.5194	28 15 21.1	1.666
06	15 46 40.40	2.4075	23 48 47.3	9.440	06	17 45 56.93	2.5188	28 16 55.8	1.492
07	15 49 04.99	2.4120	23 58 09.4	9.295	07	17 48 28.04	2.5180	28 18 20.1	1.317
08	15 51 29.84	2.4165	24 07 22.7	9.147	08	17 50 59.09	2.5170	28 19 33.8	1.142
09	15 53 54.97	2.4210	24 16 27.0	8.998	09	17 53 30.08	2.5158	28 20 37.1	0.968
10	15 56 20.36	2.4253	24 25 22.5	8.849	10	17 56 00.99	2.5146	28 21 29.9	0.793
11	15 58 46.01	2.4297	24 34 08.9	8.698	11	17 58 31.83	2.5133	28 22 12.3	0.620
12	16 01 11.92	2.4339	24 42 46.3	8.547	12	18 01 02.58	2.5117	28 22 44.3	0.447
13	16 03 38.08	2.4381	24 51 14.5	8.393	13	18 03 33.23	2.5100	28 23 05.9	0.273
14	16 06 04.49	2.4422	24 59 33.5	8.240	14	18 06 03.78	2.5081	28 23 17.0	—0.099
15	16 08 31.14	2.4463	25 07 43.3	8.085	15	18 08 34.20	2.5061	28 23 17.8	+0.073
16	16 10 58.04	2.4503	25 15 43.7	7.928	16	18 11 04.51	2.5040	28 23 08.3	0.245
17	16 13 25.17	2.4541	25 23 34.7	7.771	17	18 13 34.68	2.5018	28 22 48.4	0.417
18	16 15 52.53	2.4578	25 31 16.2	7.613	18	18 16 04.72	2.4993	28 22 18.3	0.588
19	16 18 20.11	2.4615	25 38 48.2	7.454	19	18 18 34.60	2.4968	28 21 37.9	0.758
20	16 20 47.91	2.4652	25 46 10.7	7.294	20	18 21 04.33	2.4941	28 20 47.3	0.928
21	16 23 15.93	2.4688	25 53 23.5	7.133	21	18 23 33.89	2.4912	28 19 46.5	1.098
22	16 25 44.16	2.4722	26 00 26.7	6.972	22	18 26 03.27	2.4883	28 18 35.6	1.267
23	16 28 12.59	2.4755	26 07 20.1	6.808	23	18 28 32.48	2.4852	28 17 14.5	1.435
24	16 30 41.22	2.4788	—26 14 03.7	—6.645	24	18 31 01.49	2.4818	—28 15 43.4	+1.602

MOON, 1931.

II7

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Tuesday, June 30.					Thursday, July 2.				
00	18 ^h 31 ^m 01 ^s ·49	2·4818	-28° 15' 43"·4	+ 1·602	00	20 ^h 24 ^m 25 ^s ·14	2·2148	-24° 03' 55"·6	+ 8·440
01	18 33 30·30	2·4785	28 14 02·3	1·769	01	20 26 37·82	2·2079	23 55 25·7	8·553
02	18 35 58·91	2·4750	28 12 11·1	1·936	02	20 28 50·09	2·2011	23 46 49·2	8·664
03	18 38 27·30	2·4713	28 10 10·0	2·101	03	20 31 01·95	2·1943	23 38 06·0	8·773
04	18 40 55·47	2·4677	28 07 59·0	2·266	04	20 33 13·41	2·1875	23 29 16·4	8·881
05	18 43 23·42	2·4638	28 05 38·1	2·430	05	20 35 24·45	2·1807	23 20 20·3	8·988
06	18 45 51·12	2·4597	28 03 07·4	2·593	06	20 37 35·09	2·1739	23 11 17·8	9·093
07	18 48 18·58	2·4557	28 00 27·0	2·755	07	20 39 45·32	2·1672	23 02 09·1	9·197
08	18 50 45·80	2·4514	27 57 36·8	2·916	08	20 41 55·15	2·1603	22 52 54·2	9·299
09	18 53 12·75	2·4470	27 54 37·1	3·076	09	20 44 04·56	2·1535	22 43 33·2	9·401
10	18 55 39·44	2·4425	27 51 27·7	3·236	10	20 46 13·57	2·1468	22 34 06·1	9·500
11	18 58 05·85	2·4379	27 48 08·8	3·394	11	20 48 22·17	2·1400	22 24 33·2	9·598
12	19 00 31·99	2·4333	27 44 40·4	3·552	12	20 50 30·37	2·1333	22 14 54·3	9·697
13	19 02 57·84	2·4285	27 41 02·6	3·708	13	20 52 38·17	2·1266	22 05 09·6	9·793
14	19 05 23·41	2·4236	27 37 15·4	3·863	14	20 54 45·56	2·1198	21 55 19·2	9·887
15	19 07 48·67	2·4185	27 33 19·0	4·018	15	20 56 52·55	2·1132	21 45 23·2	9·980
16	19 10 13·63	2·4134	27 29 13·3	4·172	16	20 58 59·14	2·1065	21 35 21·6	10·073
17	19 12 38·28	2·4083	27 24 58·4	4·324	17	21 01 05·33	2·0999	21 25 14·5	10·163
18	19 15 02·62	2·4030	27 20 34·4	4·475	18	21 03 11·13	2·0933	21 15 02·1	10·252
19	19 17 26·64	2·3976	27 16 01·4	4·625	19	21 05 16·53	2·0867	21 04 44·3	10·341
20	19 19 50·33	2·3922	27 11 19·4	4·775	20	21 07 21·53	2·0802	20 54 21·2	10·428
21	19 22 13·70	2·3867	27 06 28·4	4·923	21	21 09 26·15	2·0737	20 43 53·0	10·513
22	19 24 36·73	2·3809	27 01 28·7	5·069	22	21 11 30·37	2·0672	20 33 19·7	10·598
23	19 26 59·41	2·3752	-26 56 20·1	+ 5·215	23	21 13 34·21	2·0608	-20 22 41·3	+ 10·681
Wednesday, July 1.					Friday, July 3.				
00	19 29 21·75	2·3694	-26 51 02·9	+ 5·359	00	21 15 37·66	2·0543	-20 11 58·0	+ 10·763
01	19 31 43·74	2·3636	26 45 37·0	5·503	01	21 17 40·73	2·0480	20 01 09·8	10·843
02	19 34 05·38	2·3576	26 40 02·6	5·644	02	21 19 43·42	2·0417	19 50 16·8	10·923
03	19 36 26·65	2·3516	26 34 19·7	5·785	03	21 21 45·73	2·0353	19 39 19·1	11·000
04	19 38 47·57	2·3456	26 28 28·4	5·924	04	21 23 47·66	2·0291	19 28 16·8	11·077
05	19 41 08·12	2·3394	26 22 28·8	6·063	05	21 25 49·22	2·0229	19 17 09·9	11·153
06	19 43 28·30	2·3332	26 16 20·9	6·200	06	21 27 50·41	2·0168	19 05 58·4	11·228
07	19 45 48·10	2·3270	26 10 04·8	6·336	07	21 29 51·23	2·0107	18 54 42·6	11·301
08	19 48 07·54	2·3208	26 03 40·6	6·470	08	21 31 51·69	2·0047	18 43 22·3	11·373
09	19 50 26·59	2·3143	25 57 08·4	6·603	09	21 33 51·79	1·9987	18 31 57·8	11·444
10	19 52 45·26	2·3079	25 50 28·3	6·735	10	21 35 51·53	1·9927	18 20 29·0	11·515
11	19 55 03·54	2·3014	25 43 40·2	6·866	11	21 37 50·91	1·9868	18 08 56·0	11·583
12	19 57 21·43	2·2949	25 36 44·4	6·994	12	21 39 49·94	1·9809	17 57 19·0	11·651
13	19 59 38·93	2·2884	25 29 40·9	7·123	13	21 41 48·62	1·9752	17 45 37·9	11·718
14	20 01 56·04	2·2819	25 22 29·7	7·249	14	21 43 46·96	1·9695	17 33 52·9	11·783
15	20 04 12·76	2·2753	25 15 11·0	7·374	15	21 45 44·96	1·9638	17 22 04·0	11·847
16	20 06 29·07	2·2686	25 07 44·8	7·498	16	21 47 42·61	1·9581	17 10 11·3	11·910
17	20 08 44·99	2·2620	25 00 11·2	7·622	17	21 49 39·93	1·9526	16 58 14·8	11·972
18	20 11 00·51	2·2553	24 52 30·2	7·743	18	21 51 36·92	1·9471	16 46 14·7	12·033
19	20 13 15·63	2·2486	24 44 42·1	7·862	19	21 53 33·58	1·9417	16 34 10·9	12·093
20	20 15 30·34	2·2418	24 36 46·8	7·981	20	21 55 29·92	1·9363	16 22 03·5	12·153
21	20 17 44·65	2·2352	24 28 44·4	8·098	21	21 57 25·93	1·9309	16 09 52·6	12·210
22	20 19 58·56	2·2283	24 20 35·0	8·214	22	21 59 21·63	1·9257	15 57 38·3	12·266
23	20 22 12·05	2·2215	24 12 18·7	8·328	23	22 01 17·01	1·9204	15 45 20·7	12·322
24	20 24 25·14	2·2148	-24 03 55·6	+ 8·440	24	22 03 12·08	1·9153	-15 32 59·7	+ 12·377

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Saturday, July 4.					Monday, July 6.				
00	22 03 12.08	1.9153	-15 32 59.7	+12.377	00	23 30 32.20	1.7520	-4 53 28.2	+13.953
01	22 05 06.84	1.9103	15 20 35.5	12.430	01	23 32 17.27	1.7505	4 39 30.6	13.967
02	22 07 01.31	1.9053	15 08 08.1	12.483	02	23 34 02.26	1.7490	4 25 32.2	13.980
03	22 08 55.47	1.9002	14 55 37.5	12.534	03	23 35 47.15	1.7476	4 11 33.0	13.993
04	22 10 49.33	1.8953	14 43 04.0	12.584	04	23 37 31.97	1.7463	3 57 33.0	14.005
05	22 12 42.91	1.8906	14 30 27.4	12.635	05	23 39 16.71	1.7451	3 43 32.4	14.016
06	22 14 36.20	1.8858	14 17 47.8	12.683	06	23 41 01.38	1.7439	3 29 31.1	14.027
07	22 16 29.21	1.8810	14 05 05.4	12.731	07	23 42 45.98	1.7428	3 15 29.2	14.037
08	22 18 21.93	1.8765	13 52 20.1	12.778	08	23 44 30.51	1.7418	3 01 26.7	14.046
09	22 20 14.39	1.8720	13 39 32.0	12.823	09	23 46 14.99	1.7409	2 47 23.7	14.054
10	22 22 06.57	1.8675	13 26 41.3	12.868	10	23 47 59.42	1.7401	2 33 20.2	14.062
11	22 23 58.49	1.8631	13 13 47.8	12.913	11	23 49 43.80	1.7393	2 19 16.3	14.069
12	22 25 50.14	1.8588	13 00 51.8	12.955	12	23 51 28.13	1.7385	2 05 11.9	14.077
13	22 27 41.54	1.8545	12 47 53.2	12.998	13	23 53 12.42	1.7379	1 51 07.1	14.082
14	22 29 32.68	1.8503	12 34 52.1	13.038	14	23 54 56.68	1.7375	1 37 02.1	14.087
15	22 31 23.58	1.8463	12 21 48.6	13.078	15	23 56 40.92	1.7370	1 22 56.7	14.093
16	22 33 14.23	1.8422	12 08 42.7	13.118	16	23 58 25.12	1.7366	1 08 51.0	14.096
17	22 35 04.64	1.8382	11 55 34.4	13.157	17	00 00 09.31	1.7363	0 54 45.2	14.099
18	22 36 54.81	1.8343	11 42 23.9	13.194	18	00 01 53.48	1.7361	0 40 39.1	14.103
19	22 38 44.75	1.8305	11 29 11.1	13.231	19	00 03 37.64	1.7360	0 26 32.9	14.104
20	22 40 34.47	1.8268	11 15 56.2	13.267	20	00 05 21.80	1.7360	-0 12 26.6	14.105
21	22 42 23.96	1.8230	11 02 39.1	13.303	21	00 07 05.96	1.7359	+0 01 39.7	14.106
22	22 44 13.23	1.8193	10 49 19.9	13.337	22	00 08 50.11	1.7360	0 15 46.1	14.107
23	22 46 02.28	1.8158	-10 35 58.7	+13.369	23	00 10 34.28	1.7363	+0 29 52.5	+14.107
Sunday, July 5.					Tuesday, July 7.				
00	22 47 51.13	1.8124	-10 22 35.6	+13.402	00	00 12 18.46	1.7365	+0 43 58.9	+14.106
01	22 49 39.77	1.8090	10 09 10.5	13.434	01	00 14 02.66	1.7368	0 58 05.2	14.103
02	22 51 28.21	1.8057	9 55 43.5	13.465	02	00 15 46.88	1.7373	1 12 11.3	14.101
03	22 53 16.45	1.8024	9 42 14.7	13.495	03	00 17 31.13	1.7378	1 26 17.3	14.098
04	22 55 04.50	1.7993	9 28 44.1	13.525	04	00 19 15.41	1.7383	1 40 23.0	14.093
05	22 56 52.36	1.7962	9 15 11.7	13.553	05	00 20 59.73	1.7390	1 54 28.5	14.090
06	22 58 40.04	1.7932	9 01 37.7	13.581	06	00 22 44.09	1.7398	2 08 33.8	14.085
07	23 00 27.54	1.7903	8 48 02.0	13.607	07	00 24 28.50	1.7406	2 22 38.7	14.078
08	23 02 14.87	1.7874	8 34 24.8	13.633	08	00 26 12.96	1.7414	2 36 43.2	14.073
09	23 04 02.03	1.7846	8 20 46.0	13.660	09	00 27 57.47	1.7424	2 50 47.4	14.066
10	23 05 49.02	1.7818	8 07 05.6	13.684	10	00 29 42.05	1.7436	3 04 51.1	14.058
11	23 07 35.85	1.7793	7 53 23.9	13.708	11	00 31 26.70	1.7447	3 18 54.4	14.050
12	23 09 22.53	1.7768	7 39 40.7	13.732	12	00 33 11.41	1.7458	3 32 57.1	14.041
13	23 11 09.06	1.7743	7 25 56.1	13.753	13	00 34 56.20	1.7472	3 46 59.3	14.032
14	23 12 55.44	1.7718	7 12 10.3	13.775	14	00 36 41.07	1.7486	4 01 00.9	14.021
15	23 14 41.67	1.7695	6 58 23.1	13.797	15	00 38 26.03	1.7500	4 15 01.8	14.010
16	23 16 27.78	1.7673	6 44 34.7	13.817	16	00 40 11.07	1.7516	4 29 02.1	13.999
17	23 18 13.74	1.7650	6 30 45.1	13.836	17	00 41 56.22	1.7532	4 43 01.7	13.987
18	23 19 59.58	1.7630	6 16 54.4	13.855	18	00 43 41.46	1.7548	4 57 00.5	13.973
19	23 21 45.30	1.7610	6 03 02.5	13.873	19	00 45 26.80	1.7567	5 10 58.5	13.960
20	23 23 30.90	1.7590	5 49 09.6	13.890	20	00 47 12.26	1.7586	5 24 55.7	13.946
21	23 25 16.38	1.7572	5 35 15.7	13.907	21	00 48 57.83	1.7605	5 38 52.0	13.930
22	23 27 01.76	1.7554	5 21 20.8	13.923	22	00 50 43.52	1.7626	5 52 47.3	13.915
23	23 28 47.03	1.7537	5 07 24.9	13.938	23	00 52 29.34	1.7647	6 06 41.8	13.899
24	23 30 32.20	1.7520	-4 53 28.2	+13.953	24	00 54 15.28	1.7668	+6 20 35.2	+13.882

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Wednesday, July 8.					Friday, July 10.				
00	^h 00 ^m 54 ^s 15.28	1.7668	+ 6 20 35.2	+13.882	00	^h 02 ^m 23 ^s 06.38	1.9654	+16 52 32.7	+12.114
01	00 56 01.36	1.7691	6 34 27.6	13.864	01	02 25 04.48	1.9714	17 04 37.8	12.054
02	00 57 47.57	1.7714	6 48 18.9	13.846	02	02 27 02.95	1.9775	17 16 39.2	11.993
03	00 59 33.93	1.7738	7 02 09.1	13.827	03	02 29 01.78	1.9837	17 28 36.9	11.931
04	01 01 20.43	1.7763	7 15 58.1	13.807	04	02 31 00.99	1.9899	17 40 30.9	11.868
05	01 03 07.09	1.7790	7 29 45.9	13.786	05	02 33 00.57	1.9961	17 52 21.0	11.803
06	01 04 53.91	1.7817	7 43 32.4	13.764	06	02 35 00.52	2.0024	18 04 07.2	11.737
07	01 06 40.89	1.7844	7 57 17.6	13.743	07	02 37 00.86	2.0088	18 15 49.4	11.670
08	01 08 28.04	1.7873	8 11 01.5	13.720	08	02 39 01.58	2.0153	18 27 27.6	11.602
09	01 10 15.36	1.7901	8 24 44.0	13.697	09	02 41 02.69	2.0218	18 39 01.6	11.532
10	01 12 02.85	1.7931	8 38 25.1	13.672	10	02 43 04.20	2.0284	18 50 31.4	11.461
11	01 13 50.53	1.7963	8 52 04.6	13.647	11	02 45 06.10	2.0350	19 01 56.9	11.389
12	01 15 38.40	1.7994	9 05 42.7	13.622	12	02 47 08.40	2.0418	19 13 18.1	11.317
13	01 17 26.46	1.8027	9 19 19.2	13.594	13	02 49 11.11	2.0485	19 24 34.9	11.242
14	01 19 14.72	1.8059	9 32 54.0	13.567	14	02 51 14.22	2.0553	19 35 47.1	11.166
15	01 21 03.17	1.8093	9 46 27.2	13.539	15	02 53 17.74	2.0622	19 46 54.8	11.090
16	01 22 51.84	1.8128	9 59 58.7	13.510	16	02 55 21.68	2.0691	19 57 57.9	11.012
17	01 24 40.71	1.8163	10 13 28.4	13.480	17	02 57 26.03	2.0761	20 08 56.2	10.931
18	01 26 29.80	1.8200	10 26 56.3	13.449	18	02 59 30.81	2.0832	20 19 49.6	10.851
19	01 28 19.11	1.8238	10 40 22.3	13.418	19	03 01 36.01	2.0902	20 30 38.3	10.769
20	01 30 08.65	1.8275	10 53 46.5	13.387	20	03 03 41.63	2.0973	20 41 21.9	10.685
21	01 31 58.41	1.8314	11 07 08.7	13.353	21	03 05 47.68	2.1044	20 52 00.5	10.601
22	01 33 48.42	1.8354	11 20 28.9	13.319	22	03 07 54.16	2.1117	21 02 34.0	10.514
23	01 35 38.66	1.8394	+11 33 47.0	+13.284	23	03 10 01.08	2.1189	+21 13 02.2	+10.427
Thursday, July 9.					Saturday, July 11.				
00	01 37 29.15	1.8435	+11 47 03.0	+13.249	00	03 12 08.43	2.1262	+21 23 25.2	+10.338
01	01 39 19.88	1.8477	12 00 16.9	13.213	01	03 14 16.22	2.1335	21 33 42.8	10.248
02	01 41 10.87	1.8520	12 13 28.5	13.175	02	03 16 24.45	2.1409	21 43 55.0	10.157
03	01 43 02.12	1.8564	12 26 37.9	13.138	03	03 18 33.13	2.1483	21 54 01.6	10.063
04	01 44 53.64	1.8608	12 39 45.0	13.098	04	03 20 42.25	2.1558	22 04 02.6	9.969
05	01 46 45.42	1.8653	12 52 49.7	13.058	05	03 22 51.82	2.1633	22 13 57.9	9.873
06	01 48 37.47	1.8698	13 05 52.0	13.018	06	03 25 01.84	2.1708	22 23 47.4	9.776
07	01 50 29.80	1.8746	13 18 51.8	12.975	07	03 27 12.31	2.1783	22 33 31.0	9.677
08	01 52 22.42	1.8793	13 31 49.0	12.933	08	03 29 23.23	2.1858	22 43 08.6	9.577
09	01 54 15.32	1.8841	13 44 43.7	12.889	09	03 31 34.60	2.1933	22 52 40.2	9.476
10	01 56 08.51	1.8890	13 57 35.7	12.844	10	03 33 46.43	2.2010	23 02 05.7	9.373
11	01 58 02.00	1.8940	14 10 25.0	12.799	11	03 35 58.72	2.2087	23 11 24.9	9.268
12	01 59 55.79	1.8990	14 23 11.6	12.753	12	03 38 11.47	2.2163	23 20 37.8	9.162
13	02 01 49.88	1.9042	14 35 55.3	12.704	13	03 40 24.68	2.2239	23 29 44.3	9.055
14	02 03 44.29	1.9094	14 48 36.1	12.656	14	03 42 38.34	2.2316	23 38 44.4	8.946
15	02 05 39.01	1.9147	15 01 14.0	12.608	15	03 44 52.47	2.2393	23 47 37.8	8.835
16	02 07 34.05	1.9200	15 13 49.0	12.557	16	03 47 07.06	2.2469	23 56 24.6	8.723
17	02 09 29.41	1.9254	15 26 20.8	12.504	17	03 49 22.10	2.2546	24 05 04.6	8.609
18	02 11 25.10	1.9310	15 38 49.5	12.452	18	03 51 37.61	2.2623	24 13 37.7	8.495
19	02 13 21.13	1.9366	15 51 15.1	12.399	19	03 53 53.58	2.2700	24 22 04.0	8.378
20	02 15 17.49	1.9422	16 03 37.4	12.343	20	03 56 10.01	2.2777	24 30 23.1	8.260
21	02 17 14.19	1.9478	16 15 56.3	12.288	21	03 58 26.90	2.2854	24 38 35.2	8.142
22	02 19 11.23	1.9537	16 28 11.9	12.232	22	04 00 44.26	2.2931	24 46 40.1	8.020
23	02 21 08.63	1.9596	16 40 24.1	12.173	23	04 03 02.07	2.3007	24 54 37.6	7.898
24	02 23 06.38	1.9654	+16 52 32.7	+12.114	24	04 05 20.34	2.3083	+25 02 27.8	+7.774

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Sunday, July 12.					Tuesday, July 14.				
00	04 05 20.34	2.3083	+25 02 27.8	+ 7.774	00	06 03 52.39	2.5935	+28 25 14.5	+ 0.185
01	04 07 39.07	2.3159	25 10 10.5	7.648	01	06 06 28.09	2.5964	28 25 20.1	+ 0.001
02	04 09 58.25	2.3236	25 17 45.6	7.521	02	06 09 03.96	2.5992	28 25 14.6	- 0.185
03	04 12 17.90	2.3312	25 25 13.0	7.393	03	06 11 39.99	2.6018	28 24 57.9	0.371
04	04 14 37.99	2.3387	25 32 32.7	7.263	04	06 14 16.18	2.6043	28 24 30.1	0.558
05	04 16 58.54	2.3463	25 39 44.5	7.131	05	06 16 52.51	2.6066	28 23 51.0	0.745
06	04 19 19.54	2.3538	25 46 48.4	6.998	06	06 19 28.97	2.6088	28 23 00.7	0.932
07	04 21 40.99	2.3612	25 53 44.2	6.863	07	06 22 05.56	2.6108	28 21 59.2	1.119
08	04 24 02.88	2.3685	26 00 31.9	6.727	08	06 24 42.26	2.6125	28 20 46.4	1.308
09	04 26 25.21	2.3758	26 07 11.4	6.589	09	06 27 19.06	2.6141	28 19 22.3	1.496
10	04 28 47.98	2.3832	26 13 42.6	6.450	10	06 29 55.95	2.6155	28 17 46.9	1.685
11	04 31 11.19	2.3905	26 20 05.4	6.309	11	06 32 32.92	2.6168	28 16 00.1	1.875
12	04 33 34.84	2.3978	26 26 19.7	6.168	12	06 35 09.97	2.6180	28 14 01.9	2.064
13	04 35 58.92	2.4048	26 32 25.5	6.024	13	06 37 47.08	2.6189	28 11 52.4	2.253
14	04 38 23.42	2.4119	26 38 22.6	5.878	14	06 40 24.24	2.6197	28 09 31.5	2.443
15	04 40 48.35	2.4190	26 44 10.9	5.732	15	06 43 01.44	2.6203	28 06 59.2	2.633
16	04 43 13.70	2.4259	26 49 50.4	5.583	16	06 45 38.67	2.6207	28 04 15.5	2.823
17	04 45 39.46	2.4328	26 55 20.9	5.434	17	06 48 15.92	2.6208	28 01 20.4	3.013
18	04 48 05.64	2.4397	27 00 42.5	5.284	18	06 50 53.17	2.6209	27 58 13.9	3.203
19	04 50 32.22	2.4463	27 05 55.0	5.131	19	06 53 30.43	2.6206	27 54 56.1	3.393
20	04 52 59.20	2.4530	27 10 58.2	4.978	20	06 56 07.68	2.6206	27 51 26.8	3.583
21	04 55 26.58	2.4596	27 15 52.3	4.823	21	06 58 44.90	2.6202	27 47 46.2	3.771
22	04 57 54.35	2.4661	27 20 36.9	4.666	22	07 01 22.10	2.6196	27 43 54.3	3.960
23	05 00 22.51	2.4725	+27 25 12.2	+ 4.508	23	07 03 59.25	2.6188	+27 39 51.0	- 4.150
Monday, July 13.					Wednesday, July 15.				
00	05 02 51.05	2.4788	+27 29 37.9	+ 4.349	00	07 06 36.35	2.6178	+27 35 36.3	- 4.339
01	05 05 19.97	2.4850	27 33 54.1	4.189	01	07 09 13.39	2.6168	27 31 10.3	4.527
02	05 07 49.25	2.4911	27 38 00.6	4.027	02	07 11 50.36	2.6155	27 26 33.1	4.715
03	05 10 18.90	2.4972	27 41 57.3	3.863	03	07 14 27.25	2.6140	27 21 44.5	4.903
04	05 12 48.91	2.5030	27 45 44.2	3.700	04	07 17 04.04	2.6124	27 16 44.7	5.090
05	05 15 19.26	2.5088	27 49 21.3	3.534	05	07 19 40.74	2.6108	27 11 33.7	5.277
06	05 17 49.96	2.5144	27 52 48.3	3.367	06	07 22 17.33	2.6088	27 06 11.5	5.463
07	05 20 20.99	2.5199	27 56 05.3	3.199	07	07 24 53.80	2.6068	27 00 38.1	5.648
08	05 22 52.35	2.5253	27 59 12.2	3.030	08	07 27 30.14	2.6046	26 54 53.7	5.833
09	05 25 24.03	2.5307	28 02 08.9	2.860	09	07 30 06.35	2.6023	26 48 58.2	6.018
10	05 27 56.03	2.5359	28 04 55.4	2.688	10	07 32 42.41	2.5998	26 42 51.6	6.202
11	05 30 28.34	2.5409	28 07 31.5	2.515	11	07 35 18.32	2.5972	26 36 34.0	6.384
12	05 33 00.94	2.5458	28 09 57.2	2.342	12	07 37 54.07	2.5944	26 30 05.5	6.566
13	05 35 33.83	2.5506	28 12 12.5	2.168	13	07 40 29.65	2.5914	26 23 26.1	6.748
14	05 38 07.01	2.5553	28 14 17.3	1.992	14	07 43 05.04	2.5883	26 16 35.8	6.928
15	05 40 40.46	2.5598	28 16 11.5	1.814	15	07 45 40.25	2.5852	26 09 34.8	7.107
16	05 43 14.18	2.5641	28 17 55.0	1.637	16	07 48 15.26	2.5818	26 02 23.0	7.286
17	05 45 48.15	2.5683	28 19 27.9	1.458	17	07 50 50.07	2.5785	25 55 00.5	7.463
18	05 48 22.37	2.5723	28 20 50.0	1.279	18	07 53 24.68	2.5749	25 47 27.4	7.640
19	05 50 56.83	2.5763	28 22 01.4	1.099	19	07 55 59.06	2.5712	25 39 43.7	7.816
20	05 53 31.52	2.5800	28 23 01.9	0.918	20	07 58 33.22	2.5674	25 31 49.5	7.990
21	05 56 06.43	2.5836	28 23 51.5	0.736	21	08 01 07.15	2.5635	25 23 44.9	8.163
22	05 58 41.55	2.5870	28 24 30.2	0.553	22	08 03 40.84	2.5595	25 15 30.0	8.335
23	06 01 16.87	2.5903	28 24 57.9	0.369	23	08 06 14.29	2.5553	25 07 04.7	8.508
24	06 03 52.39	2.5935	+28 25 14.5	+ 0.185	24	08 08 47.48	2.5511	+24 58 29.1	- 8.678

MOON, 1931.

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THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Thursday, July 16.					Saturday, July 18.				
00	08 08 47.48	2.5511	+24 58 29.1	-8.678	00	10 05 13.06	2.2925	+15 14 47.5	-14.989
01	08 11 20.42	2.5468	24 49 43.4	8.845	01	10 07 30.45	2.2873	14 59 45.5	15.077
02	08 13 53.09	2.5423	24 40 47.7	9.013	02	10 09 47.53	2.2821	14 44 38.3	15.163
03	08 16 25.50	2.5378	24 31 41.9	9.179	03	10 12 04.30	2.2769	14 29 26.0	15.247
04	08 18 57.62	2.5331	24 22 26.2	9.344	04	10 14 20.76	2.2718	14 14 08.7	15.329
05	08 21 29.47	2.5284	24 13 00.6	9.508	05	10 16 36.91	2.2667	13 58 46.5	15.409
06	08 24 01.03	2.5237	24 03 25.3	9.669	06	10 18 52.76	2.2617	13 43 19.6	15.488
07	08 26 32.31	2.5188	23 53 40.3	9.830	07	10 21 08.31	2.2568	13 27 48.0	15.564
08	08 29 03.29	2.5139	23 43 45.7	9.989	08	10 23 23.57	2.2518	13 12 11.9	15.639
09	08 31 33.98	2.5089	23 33 41.6	10.147	09	10 25 38.53	2.2470	12 56 31.3	15.713
10	08 34 04.36	2.5038	23 23 28.1	10.303	10	10 27 53.21	2.2423	12 40 46.4	15.783
11	08 36 34.43	2.4986	23 13 05.2	10.458	11	10 30 07.61	2.2376	12 24 57.4	15.852
12	08 39 04.19	2.4934	23 02 33.1	10.612	12	10 32 21.72	2.2329	12 09 04.2	15.920
13	08 41 33.64	2.4882	22 51 51.8	10.763	13	10 34 35.56	2.2283	11 53 07.0	15.985
14	08 44 02.77	2.4828	22 41 01.5	10.913	14	10 36 49.12	2.2238	11 37 06.0	16.048
15	08 46 31.57	2.4774	22 30 02.2	11.062	15	10 39 02.42	2.2194	11 21 01.2	16.110
16	08 49 00.06	2.4720	22 18 54.1	11.208	16	10 41 15.45	2.2151	11 04 52.8	16.170
17	08 51 28.21	2.4665	22 07 37.2	11.354	17	10 43 28.23	2.2108	10 48 40.8	16.228
18	08 53 56.04	2.4611	21 56 11.6	11.498	18	10 45 40.75	2.2065	10 32 25.4	16.285
19	08 56 23.54	2.4555	21 44 37.4	11.640	19	10 47 53.01	2.2023	10 16 06.6	16.339
20	08 58 50.70	2.4499	21 32 54.8	11.781	20	10 50 05.03	2.1983	9 59 44.7	16.392
21	09 01 17.53	2.4443	21 21 03.7	11.920	21	10 52 16.81	2.1943	9 43 19.6	16.443
22	09 03 44.02	2.4387	21 09 04.4	12.056	22	10 54 28.35	2.1903	9 26 51.5	16.493
23	09 06 10.17	2.4330	+20 56 57.0	-12.192	23	10 56 39.65	2.1865	+ 9 10 20.5	-16.540
Friday, July 17.					Sunday, July 19.				
00	09 08 35.98	2.4273	+20 44 41.4	-12.326	00	10 58 50.73	2.1828	+ 8 53 46.7	-16.586
01	09 11 01.45	2.4217	20 32 17.9	12.458	01	11 01 01.58	2.1791	8 37 10.2	16.629
02	09 13 26.58	2.4159	20 19 46.5	12.588	02	11 03 12.22	2.1755	8 20 31.2	16.671
03	09 15 51.36	2.4101	20 07 07.4	12.716	03	11 05 22.64	2.1719	8 03 49.7	16.712
04	09 18 15.79	2.4044	19 54 20.6	12.843	04	11 07 32.85	2.1685	7 47 05.8	16.750
05	09 20 39.89	2.3987	19 41 26.3	12.967	05	11 09 42.86	2.1652	7 30 19.7	16.787
06	09 23 03.64	2.3929	19 28 24.6	13.090	06	11 11 52.67	2.1618	7 13 31.4	16.823
07	09 25 27.04	2.3872	19 15 15.5	13.212	07	11 14 02.28	2.1587	6 56 41.0	16.855
08	09 27 50.11	2.3816	19 01 59.2	13.331	08	11 16 11.71	2.1557	6 39 48.8	16.887
09	09 30 12.83	2.3758	18 48 35.8	13.448	09	11 18 20.96	2.1526	6 22 54.6	16.917
10	09 32 35.20	2.3700	18 35 05.5	13.563	10	11 20 30.02	2.1496	6 05 58.8	16.945
11	09 34 57.23	2.3643	18 21 28.2	13.678	11	11 22 38.91	2.1468	5 49 01.2	16.972
12	09 37 18.92	2.3587	18 07 44.1	13.790	12	11 24 47.63	2.1440	5 32 02.2	16.996
13	09 39 40.27	2.3530	17 53 53.4	13.900	13	11 26 56.19	2.1413	5 15 01.7	17.019
14	09 42 01.28	2.3473	17 39 56.1	14.008	14	11 29 04.59	2.1388	4 57 59.9	17.040
15	09 44 21.95	2.3417	17 25 52.4	14.114	15	11 31 12.84	2.1363	4 40 56.9	17.060
16	09 46 42.28	2.3361	17 11 42.4	14.219	16	11 33 20.95	2.1339	4 23 52.7	17.078
17	09 49 02.28	2.3306	16 57 26.1	14.323	17	11 35 28.91	2.1316	4 06 47.5	17.095
18	09 51 21.95	2.3250	16 43 03.7	14.423	18	11 37 36.74	2.1294	3 49 41.3	17.110
19	09 53 41.28	2.3195	16 28 35.4	14.522	19	11 39 44.44	2.1273	3 32 34.3	17.123
20	09 56 00.29	2.3141	16 14 01.1	14.619	20	11 41 52.01	2.1252	3 15 26.6	17.133
21	09 58 18.97	2.3086	15 59 21.1	14.714	21	11 43 59.46	2.1233	2 58 18.3	17.144
22	10 00 37.32	2.3032	15 44 35.4	14.808	22	11 46 06.80	2.1213	2 41 09.3	17.153
23	10 02 55.35	2.2978	15 29 44.2	14.899	23	11 48 14.02	2.1195	2 24 00.0	17.158
24	10 05 13.06	2.2925	+15 14 47.5	-14.989	24	11 50 21.14	2.1178	+ 2 06 50.3	-17.163

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Monday, July 20.					Wednesday, July 22.				
00	11 50 21.14	2.1178	+ 2 06 50.3	-17.163	00	13 31 47.78	2.1426	-11 13 24.1	-15.611
01	11 52 28.16	2.1163	1 49 40.4	17.167	01	13 33 56.41	2.1452	11 28 58.7	15.543
02	11 54 35.10	2.1148	1 32 30.3	17.168	02	13 36 05.20	2.1478	11 44 29.3	15.475
03	11 56 41.94	2.1133	1 15 20.2	17.168	03	13 38 14.14	2.1504	11 59 55.7	15.404
04	11 58 48.70	2.1121	0 58 10.1	17.168	04	13 40 23.25	2.1533	12 15 17.8	15.332
05	12 00 55.39	2.1108	0 41 00.1	17.164	05	13 42 32.53	2.1561	12 30 35.5	15.258
06	12 03 02.00	2.1097	0 23 50.4	17.159	06	13 44 41.98	2.1590	12 45 48.8	15.184
07	12 05 08.55	2.1087	+ 0 06 41.0	17.153	07	13 46 51.61	2.1620	13 00 57.6	15.108
08	12 07 15.04	2.1077	- 0 10 28.0	17.146	08	13 49 01.42	2.1651	13 16 01.7	15.030
09	12 09 21.47	2.1068	0 27 36.5	17.137	09	13 51 11.42	2.1682	13 31 01.2	14.952
10	12 11 27.86	2.1061	0 44 44.4	17.125	10	13 53 21.60	2.1713	13 45 55.9	14.871
11	12 13 34.20	2.1054	1 01 51.5	17.113	11	13 55 31.98	2.1746	14 00 45.7	14.789
12	12 15 40.51	2.1049	1 18 57.9	17.099	12	13 57 42.55	2.1778	14 15 30.6	14.707
13	12 17 46.79	2.1044	1 36 03.4	17.083	13	13 59 53.32	2.1813	14 30 10.5	14.623
14	12 19 53.04	2.1039	1 53 07.9	17.067	14	14 02 04.30	2.1847	14 44 45.3	14.537
15	12 21 59.26	2.1037	2 10 11.4	17.048	15	14 04 15.48	2.1881	14 59 14.9	14.449
16	12 24 05.48	2.1035	2 27 13.7	17.028	16	14 06 26.87	2.1916	15 13 39.2	14.361
17	12 26 11.68	2.1033	2 44 14.8	17.007	17	14 08 38.47	2.1952	15 27 58.2	14.272
18	12 28 17.87	2.1033	3 01 14.5	16.983	18	14 10 50.29	2.1989	15 42 11.8	14.180
19	12 30 24.07	2.1033	3 18 12.7	16.958	19	14 13 02.34	2.2026	15 56 19.8	14.088
20	12 32 30.27	2.1035	3 35 09.5	16.933	20	14 15 14.60	2.2063	16 10 22.3	13.994
21	12 34 36.49	2.1038	3 52 04.6	16.905	21	14 17 27.09	2.2101	16 24 19.1	13.899
22	12 36 42.72	2.1041	4 08 58.1	16.876	22	14 19 39.81	2.2139	16 38 10.2	13.803
23	12 38 48.98	2.1045	- 4 25 49.7	-16.845	23	14 21 52.76	2.2178	-16 51 55.4	-13.704
Tuesday, July 21.					Thursday, July 23.				
00	12 40 55.26	2.1050	- 4 42 39.5	-16.813	00	14 24 05.94	2.2217	-17 05 34.7	-13.605
01	12 43 01.58	2.1056	4 59 27.3	16.780	01	14 26 19.36	2.2257	17 19 08.0	13.505
02	12 45 07.93	2.1063	5 16 13.1	16.745	02	14 28 33.02	2.2297	17 32 35.3	13.404
03	12 47 14.33	2.1070	5 32 56.7	16.708	03	14 30 46.92	2.2337	17 45 56.5	13.301
04	12 49 20.77	2.1079	5 49 38.1	16.670	04	14 33 01.06	2.2378	17 59 11.4	13.195
05	12 51 27.28	2.1088	6 06 17.1	16.631	05	14 35 15.46	2.2420	18 12 19.9	13.090
06	12 53 33.83	2.1098	6 22 53.8	16.590	06	14 37 30.10	2.2461	18 25 22.2	12.983
07	12 55 40.46	2.1110	6 39 27.9	16.548	07	14 39 44.99	2.2503	18 38 17.9	12.874
08	12 57 47.15	2.1122	6 55 59.5	16.504	08	14 42 00.13	2.2544	18 51 07.1	12.765
09	12 59 53.92	2.1135	7 12 28.4	16.459	09	14 44 15.52	2.2587	19 03 49.7	12.654
10	13 02 00.77	2.1148	7 28 54.6	16.413	10	14 46 31.17	2.2630	19 16 25.6	12.542
11	13 04 07.70	2.1163	7 45 17.9	16.364	11	14 48 47.08	2.2673	19 28 54.7	12.428
12	13 06 14.72	2.1178	8 01 38.3	16.315	12	14 51 03.24	2.2715	19 41 17.0	12.314
13	13 08 21.84	2.1194	8 17 55.7	16.264	13	14 53 19.66	2.2758	19 53 32.4	12.198
14	13 10 29.05	2.1211	8 34 10.0	16.212	14	14 55 36.34	2.2802	20 05 40.7	12.080
15	13 12 36.37	2.1230	8 50 21.1	16.158	15	14 57 53.28	2.2846	20 17 42.0	11.962
16	13 14 43.81	2.1248	9 06 29.0	16.103	16	15 00 10.49	2.2890	20 29 36.1	11.842
17	13 16 51.35	2.1268	9 22 33.5	16.047	17	15 02 27.96	2.2933	20 41 23.0	11.721
18	13 18 59.02	2.1288	9 38 34.6	15.983	18	15 04 45.69	2.2977	20 53 02.6	11.598
19	13 21 06.81	2.1309	9 54 32.1	15.928	19	15 07 03.68	2.3021	21 04 34.8	11.475
20	13 23 14.73	2.1331	10 10 26.0	15.868	20	15 09 21.94	2.3065	21 15 59.6	11.350
21	13 25 22.78	2.1353	10 26 16.3	15.807	21	15 11 40.46	2.3108	21 27 16.8	11.224
22	13 27 30.97	2.1377	10 42 02.8	15.743	22	15 13 59.24	2.3153	21 38 26.5	11.097
23	13 29 39.30	2.1401	10 57 45.4	15.678	23	15 16 18.29	2.3197	21 49 28.4	10.968
24	13 31 47.78	2.1426	-11 13 24.1	-15.611	24	15 18 37.60	2.3240	-22 00 22.7	-10.839

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Friday, July 24.					Sunday, July 26.				
00	15 18 37.60	2.3240	-22 00 22.7	-10.839	00	17 14 28.57	2.4758	-27 51 51.5	-3.495
01	15 20 57.17	2.3284	22 11 09.1	10.708	01	17 16 57.15	2.4768	27 55 16.2	3.328
02	15 23 17.01	2.3328	22 21 47.7	10.577	02	17 19 25.78	2.4776	27 58 30.8	3.158
03	15 25 37.10	2.3371	22 32 18.3	10.443	03	17 21 54.46	2.4783	28 01 35.1	2.988
04	15 27 57.46	2.3415	22 42 40.8	10.308	04	17 24 23.18	2.4788	28 04 29.3	2.818
05	15 30 18.08	2.3458	22 52 55.3	10.173	05	17 26 51.92	2.4793	28 07 13.3	2.649
06	15 32 38.95	2.3500	23 03 01.6	10.037	06	17 29 20.69	2.4797	28 09 47.2	2.480
07	15 35 00.08	2.3543	23 12 59.7	9.899	07	17 31 49.48	2.4798	28 12 10.9	2.310
08	15 37 21.46	2.3585	23 22 49.5	9.760	08	17 34 18.27	2.4799	28 14 24.4	2.141
09	15 39 43.10	2.3627	23 32 30.9	9.621	09	17 36 47.07	2.4799	28 16 27.8	1.972
10	15 42 04.99	2.3668	23 42 04.0	9.480	10	17 39 15.86	2.4797	28 18 21.0	1.803
11	15 44 27.12	2.3710	23 51 28.5	9.338	11	17 41 44.63	2.4793	28 20 04.1	1.634
12	15 46 49.51	2.3752	24 00 44.5	9.195	12	17 44 13.38	2.4789	28 21 37.1	1.464
13	15 49 12.14	2.3792	24 09 51.9	9.051	13	17 46 42.10	2.4783	28 22 59.8	1.294
14	15 51 35.01	2.3832	24 18 50.6	8.906	14	17 49 10.78	2.4776	28 24 12.4	1.125
15	15 53 58.12	2.3872	24 27 40.6	8.759	15	17 51 39.41	2.4768	28 25 14.8	0.955
16	15 56 21.47	2.3911	24 36 21.7	8.612	16	17 54 07.99	2.4758	28 26 07.0	0.787
17	15 58 45.05	2.3949	24 44 54.0	8.464	17	17 56 36.51	2.4747	28 26 49.2	0.618
18	16 01 08.86	2.3988	24 53 17.4	8.315	18	17 59 04.95	2.4734	28 27 21.2	0.449
19	16 03 32.90	2.4026	25 01 31.8	8.165	19	18 01 33.32	2.4721	28 27 43.1	0.282
20	16 05 57.17	2.4063	25 09 37.2	8.014	20	18 04 01.60	2.4706	28 27 55.0	-0.113
21	16 08 21.65	2.4098	25 17 33.5	7.863	21	18 06 29.79	2.4690	28 27 56.7	+0.054
22	16 10 46.35	2.4134	25 25 20.7	7.710	22	18 08 57.88	2.4672	28 27 48.5	0.222
23	16 13 11.26	2.4169	-25 32 58.7	-7.556	23	18 11 25.85	2.4653	-28 27 30.1	+0.389
Saturday, July 25.					Monday, July 27.				
00	16 15 36.38	2.4203	-25 40 27.4	-7.401	00	18 13 53.71	2.4633	-28 27 01.8	+0.555
01	16 18 01.70	2.4238	25 47 46.8	7.246	01	18 16 21.45	2.4612	28 26 23.5	0.722
02	16 20 27.23	2.4271	25 54 56.9	7.090	02	18 18 49.05	2.4588	28 25 35.2	0.887
03	16 22 52.95	2.4303	26 01 57.6	6.933	03	18 21 16.51	2.4564	28 24 37.1	1.052
04	16 25 18.86	2.4334	26 08 48.8	6.775	04	18 23 43.82	2.4539	28 23 29.0	1.217
05	16 27 44.96	2.4365	26 15 30.6	6.618	05	18 26 10.98	2.4513	28 22 11.1	1.381
06	16 30 11.24	2.4394	26 22 02.9	6.458	06	18 28 37.98	2.4485	28 20 43.3	1.545
07	16 32 37.69	2.4423	26 28 25.6	6.298	07	18 31 04.80	2.4456	28 19 05.7	1.708
08	16 35 04.31	2.4450	26 34 38.6	6.138	08	18 33 31.45	2.4427	28 17 18.4	1.869
09	16 37 31.09	2.4478	26 40 42.1	5.977	09	18 35 57.92	2.4395	28 15 21.4	2.031
10	16 39 58.04	2.4504	26 46 35.8	5.814	10	18 38 24.19	2.4362	28 13 14.7	2.193
11	16 42 25.14	2.4529	26 52 19.8	5.652	11	18 40 50.26	2.4328	28 10 58.3	2.353
12	16 44 52.39	2.4553	26 57 54.0	5.488	12	18 43 16.13	2.4294	28 08 32.3	2.513
13	16 47 19.78	2.4576	27 03 18.4	5.325	13	18 45 41.79	2.4258	28 05 56.8	2.672
14	16 49 47.30	2.4598	27 08 33.0	5.161	14	18 48 07.22	2.4220	28 03 11.7	2.830
15	16 52 14.96	2.4620	27 13 37.7	4.996	15	18 50 32.43	2.4183	28 00 17.2	2.987
16	16 54 42.74	2.4639	27 18 32.5	4.831	16	18 52 57.41	2.4143	27 57 13.3	3.143
17	16 57 10.63	2.4658	27 23 17.4	4.665	17	18 55 22.15	2.4103	27 54 00.0	3.299
18	16 59 38.63	2.4676	27 27 52.3	4.499	18	18 57 46.65	2.4062	27 50 37.4	3.454
19	17 02 06.74	2.4693	27 32 17.3	4.333	19	19 00 10.89	2.4021	27 47 05.5	3.608
20	17 04 34.94	2.4708	27 36 32.2	4.165	20	19 02 34.88	2.3977	27 43 24.4	3.762
21	17 07 03.23	2.4722	27 40 37.1	3.998	21	19 04 58.61	2.3933	27 39 34.1	3.914
22	17 09 31.60	2.4735	27 44 32.0	3.831	22	19 07 22.07	2.3887	27 35 34.7	4.066
23	17 12 00.05	2.4748	27 48 16.8	3.663	23	19 09 45.25	2.3840	27 31 26.2	4.216
24	17 14 28.57	2.4758	-27 51 51.5	-3.495	24	19 12 08.15	2.3793	-27 27 08.8	+4.365

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Tuesday, July 28.					Thursday, July 30.				
00	19 12 08.15	2.3793	-27 27 08.8	+ 4.365	00	20 59 46.58	2.0939	-21 26 42.2	+10.186
01	19 14 30.77	2.3746	27 22 42.4	4.514	01	21 01 52.03	2.0878	21 16 28.3	10.276
02	19 16 53.10	2.3697	27 18 07.1	4.662	02	21 03 57.11	2.0816	21 06 09.1	10.365
03	19 19 15.13	2.3647	27 13 23.0	4.808	03	21 06 01.82	2.0753	20 55 44.5	10.454
04	19 21 36.86	2.3596	27 08 30.2	4.953	04	21 08 06.15	2.0692	20 45 14.6	10.541
05	19 23 58.28	2.3545	27 03 28.6	5.098	05	21 10 10.12	2.0631	20 34 39.6	10.627
06	19 26 19.40	2.3493	26 58 18.4	5.241	06	21 12 13.72	2.0569	20 23 59.4	10.711
07	19 28 40.20	2.3440	26 52 59.7	5.383	07	21 14 16.95	2.0508	20 13 14.3	10.794
08	19 31 00.68	2.3387	26 47 32.4	5.525	08	21 16 19.82	2.0448	20 02 24.1	10.877
09	19 33 20.84	2.3333	26 41 56.7	5.665	09	21 18 22.33	2.0388	19 51 29.0	10.958
10	19 35 40.67	2.3278	26 36 12.6	5.804	10	21 20 24.48	2.0328	19 40 29.2	11.038
11	19 38 00.17	2.3223	26 30 20.2	5.942	11	21 22 26.27	2.0268	19 29 24.5	11.117
12	19 40 19.34	2.3167	26 24 19.6	6.078	12	21 24 27.70	2.0209	19 18 15.2	11.193
13	19 42 38.17	2.3110	26 18 10.8	6.214	13	21 26 28.78	2.0151	19 07 01.3	11.269
14	19 44 56.66	2.3053	26 11 53.9	6.348	14	21 28 29.51	2.0093	18 55 42.9	11.344
15	19 47 14.80	2.2994	26 05 29.0	6.482	15	21 30 29.90	2.0035	18 44 20.0	11.418
16	19 49 32.59	2.2936	25 58 56.1	6.614	16	21 32 29.93	1.9978	18 32 52.7	11.491
17	19 51 50.03	2.2877	25 52 15.3	6.745	17	21 34 29.63	1.9921	18 21 21.1	11.563
18	19 54 07.11	2.2818	25 45 26.7	6.874	18	21 36 28.98	1.9864	18 09 45.2	11.633
19	19 56 23.84	2.2758	25 38 30.4	7.003	19	21 38 28.00	1.9808	17 58 05.2	11.702
20	19 58 40.21	2.2698	25 31 26.4	7.130	20	21 40 26.68	1.9753	17 46 21.0	11.770
21	20 00 56.22	2.2638	25 24 14.8	7.257	21	21 42 25.03	1.9697	17 34 32.8	11.837
22	20 03 11.87	2.2577	25 16 55.6	7.382	22	21 44 23.04	1.9642	17 22 40.6	11.903
23	20 05 27.14	2.2515	-25 09 29.0	+ 7.505	23	21 46 20.73	1.9588	-17 10 44.5	+11.967
Wednesday, July 29.					Friday, July 31.				
00	20 07 42.05	2.2454	-25 01 55.0	+ 7.628	00	21 48 18.10	1.9535	-16 58 44.6	+12.030
01	20 09 56.59	2.2393	24 54 13.7	7.748	01	21 50 15.15	1.9482	16 46 40.9	12.093
02	20 12 10.76	2.2330	24 46 25.2	7.868	02	21 52 11.88	1.9428	16 34 33.5	12.154
03	20 14 24.55	2.2268	24 38 29.5	7.987	03	21 54 08.29	1.9376	16 22 22.4	12.214
04	20 16 37.97	2.2205	24 30 26.8	8.104	04	21 56 04.39	1.9325	16 10 07.8	12.273
05	20 18 51.01	2.2143	24 22 17.0	8.221	05	21 58 00.19	1.9274	15 57 49.6	12.332
06	20 21 03.68	2.2079	24 14 00.3	8.335	06	21 59 55.68	1.9223	15 45 28.0	12.388
07	20 23 15.96	2.2016	24 05 36.8	8.448	07	22 01 50.86	1.9173	15 33 03.0	12.444
08	20 25 27.87	2.1953	23 57 06.5	8.561	08	22 03 45.75	1.9124	15 20 34.7	12.499
09	20 27 39.40	2.1889	23 48 29.5	8.673	09	22 05 40.35	1.9075	15 08 03.1	12.553
10	20 29 50.54	2.1826	23 39 45.8	8.782	10	22 07 34.65	1.9027	14 55 28.3	12.606
11	20 32 01.31	2.1763	23 30 55.7	8.890	11	22 09 28.67	1.8979	14 42 50.4	12.658
12	20 34 11.69	2.1698	23 21 59.0	8.998	12	22 11 22.40	1.8932	14 30 09.4	12.708
13	20 36 21.69	2.1635	23 12 55.9	9.103	13	22 13 15.85	1.8886	14 17 25.4	12.758
14	20 38 31.31	2.1572	23 03 46.6	9.208	14	22 15 09.03	1.8840	14 04 38.4	12.807
15	20 40 40.55	2.1508	22 54 31.0	9.312	15	22 17 01.93	1.8795	13 51 48.6	12.854
16	20 42 49.40	2.1444	22 45 09.2	9.413	16	22 18 54.57	1.8751	13 38 55.9	12.901
17	20 44 57.88	2.1381	22 35 41.4	9.513	17	22 20 46.94	1.8706	13 26 00.5	12.946
18	20 47 05.97	2.1318	22 26 07.6	9.614	18	22 22 39.04	1.8663	13 13 02.4	12.992
19	20 49 13.69	2.1254	22 16 27.7	9.713	19	22 24 30.89	1.8621	13 00 01.5	13.036
20	20 51 21.02	2.1191	22 06 42.0	9.810	20	22 26 22.49	1.8578	12 46 58.1	13.078
21	20 53 27.98	2.1128	21 56 50.5	9.905	21	22 28 13.83	1.8537	12 33 52.2	13.119
22	20 55 34.56	2.1065	21 46 53.4	9.999	22	22 30 04.93	1.8497	12 20 43.8	13.161
23	20 57 40.76	2.1002	21 36 50.6	10.093	23	22 31 55.79	1.8456	12 07 32.9	13.201
24	20 59 46.58	2.0939	-21 26 42.2	+10.186	24	22 33 46.40	1.8416	-11 54 19.7	+13.240

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Saturday, August 1.					Monday, August 3.				
00	22 33 46.40	1.8416	-11 54 19.7	+13.240	00	23 58 56.47	1.7346	-0 50 01.1	+14.140
01	22 35 36.78	1.8378	11 41 04.1	13.278	01	00 00 40.53	1.7341	0 35 52.7	14.140
02	22 37 26.93	1.8340	11 27 46.3	13.315	02	00 02 24.56	1.7338	0 21 44.3	14.140
03	22 39 16.86	1.8303	11 14 26.3	13.351	03	00 04 08.58	1.7335	-0 07 35.9	14.140
04	22 41 06.56	1.8265	11 01 04.2	13.387	04	00 05 52.58	1.7333	+0 06 32.5	14.138
05	22 42 56.04	1.8229	10 47 39.9	13.422	05	00 07 36.57	1.7331	0 20 40.7	14.136
06	22 44 45.31	1.8194	10 34 13.6	13.454	06	00 09 20.55	1.7330	0 34 48.8	14.133
07	22 46 34.37	1.8159	10 20 45.4	13.487	07	00 11 04.53	1.7331	0 48 56.6	14.129
08	22 48 23.22	1.8124	10 07 15.2	13.519	08	00 12 48.52	1.7332	1 03 04.3	14.125
09	22 50 11.86	1.8091	9 53 43.1	13.551	09	00 14 32.51	1.7333	1 17 11.6	14.120
10	22 52 00.31	1.8059	9 40 09.1	13.581	10	00 16 16.51	1.7334	1 31 18.7	14.115
11	22 53 48.57	1.8027	9 26 33.4	13.609	11	00 18 00.52	1.7338	1 45 25.4	14.108
12	22 55 36.63	1.7995	9 12 56.0	13.638	12	00 19 44.56	1.7342	1 59 31.7	14.102
13	22 57 24.51	1.7965	8 59 16.9	13.665	13	00 21 28.62	1.7346	2 13 37.6	14.094
14	22 59 12.21	1.7935	8 45 36.2	13.693	14	00 23 12.71	1.7352	2 27 43.0	14.086
15	23 00 59.73	1.7905	8 31 53.8	13.718	15	00 24 56.84	1.7358	2 41 47.9	14.077
16	23 02 47.07	1.7877	8 18 10.0	13.743	16	00 26 41.00	1.7364	2 55 52.2	14.067
17	23 04 34.25	1.7849	8 04 24.7	13.768	17	00 28 25.21	1.7372	3 09 55.9	14.057
18	23 06 21.26	1.7822	7 50 37.9	13.791	18	00 30 09.46	1.7379	3 23 59.0	14.046
19	23 08 08.11	1.7796	7 36 49.8	13.813	19	00 31 53.76	1.7389	3 38 01.4	14.034
20	23 09 54.81	1.7770	7 23 00.3	13.835	20	00 33 38.13	1.7399	3 52 03.1	14.022
21	23 11 41.35	1.7745	7 09 09.6	13.856	21	00 35 22.55	1.7409	4 06 04.0	14.009
22	23 13 27.75	1.7722	6 55 17.6	13.877	22	00 37 07.04	1.7421	4 20 04.2	13.996
23	23 15 14.01	1.7698	-6 41 24.4	+13.896	23	00 38 51.60	1.7433	+4 34 03.5	+13.981
Sunday, August 2.					Tuesday, August 4.				
00	23 17 00.12	1.7674	-6 27 30.1	+13.914	00	00 40 36.23	1.7446	+4 48 01.9	+13.966
01	23 18 46.10	1.7653	6 13 34.7	13.932	01	00 42 20.95	1.7460	5 01 59.4	13.951
02	23 20 31.95	1.7631	5 59 38.3	13.949	02	00 44 05.75	1.7473	5 15 56.0	13.934
03	23 22 17.67	1.7610	5 45 40.8	13.966	03	00 45 50.63	1.7489	5 29 51.5	13.917
04	23 24 03.27	1.7591	5 31 42.4	13.981	04	00 47 35.62	1.7506	5 43 46.0	13.900
05	23 25 48.76	1.7572	5 17 43.1	13.996	05	00 49 20.70	1.7522	5 57 39.5	13.882
06	23 27 34.13	1.7553	5 03 42.9	14.011	06	00 51 05.88	1.7539	6 11 31.8	13.862
07	23 29 19.39	1.7535	4 49 41.8	14.024	07	00 52 51.17	1.7557	6 25 22.9	13.842
08	23 31 04.55	1.7518	4 35 40.0	14.036	08	00 54 36.56	1.7576	6 39 12.8	13.822
09	23 32 49.60	1.7502	4 21 37.5	14.048	09	00 56 22.08	1.7597	6 53 01.5	13.801
10	23 34 34.57	1.7487	4 07 34.3	14.059	10	00 58 07.72	1.7617	7 06 48.9	13.778
11	23 36 19.44	1.7471	3 53 30.4	14.069	11	00 59 53.48	1.7638	7 20 34.9	13.756
12	23 38 04.22	1.7457	3 39 26.0	14.078	12	01 01 39.37	1.7660	7 34 19.6	13.733
13	23 39 48.92	1.7444	3 25 21.0	14.088	13	01 03 25.40	1.7683	7 48 02.9	13.709
14	23 41 33.55	1.7432	3 11 15.5	14.096	14	01 05 11.56	1.7706	8 01 44.7	13.684
15	23 43 18.10	1.7419	2 57 09.5	14.104	15	01 06 57.87	1.7731	8 15 25.0	13.659
16	23 45 02.58	1.7408	2 43 03.0	14.111	16	01 08 44.33	1.7756	8 29 03.8	13.633
17	23 46 47.00	1.7398	2 28 56.2	14.117	17	01 10 30.94	1.7782	8 42 40.9	13.605
18	23 48 31.35	1.7388	2 14 49.0	14.122	18	01 12 17.71	1.7808	8 56 16.4	13.578
19	23 50 15.65	1.7379	2 00 41.6	14.127	19	01 14 04.64	1.7835	9 09 50.3	13.550
20	23 51 59.90	1.7371	1 46 33.8	14.131	20	01 15 51.73	1.7863	9 23 22.4	13.521
21	23 53 44.10	1.7363	1 32 25.9	14.134	21	01 17 39.00	1.7893	9 36 52.8	13.491
22	23 55 28.26	1.7357	1 18 17.7	14.137	22	01 19 26.45	1.7923	9 50 21.3	13.460
23	23 57 12.38	1.7351	1 04 09.5	14.138	23	01 21 14.07	1.7953	10 03 48.0	13.429
24	23 58 56.47	1.7346	-0 50 01.1	+14.140	24	01 23 01.88	1.7984	+10 17 12.8	+13.397

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Wednesday, August 5.					Friday, August 7.				
00	01 23 01.38	1.7984	+10 17 12.8	+13.397	00	02 54 22.42	2.0347	+20 07 18.9	+10.828
01	01 24 49.88	1.8017	10 30 35.6	13.364	01	02 56 24.70	2.0413	20 18 06.3	10.750
02	01 26 38.08	1.8049	10 43 56.5	13.331	02	02 58 27.37	2.0478	20 28 48.9	10.671
03	01 28 26.47	1.8083	10 57 15.3	13.296	03	03 00 30.44	2.0545	20 39 26.8	10.590
04	01 30 15.07	1.8117	11 10 32.0	13.261	04	03 02 33.91	2.0612	20 49 59.7	10.508
05	01 32 03.87	1.8152	11 23 46.6	13.225	05	03 04 37.78	2.0679	21 00 27.7	10.425
06	01 33 52.89	1.8188	11 36 59.0	13.188	06	03 06 42.06	2.0747	21 10 50.7	10.340
07	01 35 42.12	1.8224	11 50 09.2	13.151	07	03 08 46.74	2.0815	21 21 08.5	10.254
08	01 37 31.58	1.8262	12 03 17.1	13.113	08	03 10 51.84	2.0885	21 31 21.2	10.168
09	01 39 21.26	1.8300	12 16 22.7	13.073	09	03 12 57.36	2.0954	21 41 28.6	10.079
10	01 41 11.18	1.8339	12 29 25.9	13.033	10	03 15 03.29	2.1023	21 51 30.7	9.991
11	01 43 01.33	1.8378	12 42 26.7	12.993	11	03 17 09.64	2.1094	22 01 27.5	9.900
12	01 44 51.72	1.8419	12 55 25.0	12.951	12	03 19 16.42	2.1165	22 11 18.7	9.808
13	01 46 42.36	1.8460	13 08 20.8	12.908	13	03 21 23.62	2.1236	22 21 04.4	9.714
14	01 48 33.24	1.8502	13 21 14.0	12.865	14	03 23 31.25	2.1307	22 30 44.4	9.619
15	01 50 24.38	1.8545	13 34 04.6	12.821	15	03 25 39.30	2.1378	22 40 18.7	9.524
16	01 52 15.78	1.8588	13 46 52.5	12.776	16	03 27 47.79	2.1451	22 49 47.3	9.427
17	01 54 07.43	1.8632	13 59 37.7	12.731	17	03 29 56.71	2.1523	22 59 09.9	9.328
18	01 55 59.36	1.8678	14 12 20.2	12.683	18	03 32 06.07	2.1596	23 08 26.7	9.229
19	01 57 51.56	1.8723	14 24 59.7	12.635	19	03 34 15.86	2.1668	23 17 37.4	9.127
20	01 59 44.03	1.8768	14 37 36.4	12.588	20	03 36 26.09	2.1742	23 26 41.9	9.024
21	02 01 36.78	1.8816	14 50 10.2	12.538	21	03 38 36.76	2.1815	23 35 40.3	8.921
22	02 03 29.82	1.8863	15 02 40.9	12.488	22	03 40 47.87	2.1888	23 44 32.4	8.816
23	02 05 23.14	1.8912	+15 15 08.7	+12.437	23	03 42 59.42	2.1963	+23 53 18.2	+ 8.709
Thursday, August 6.					Saturday, August 8.				
00	02 07 16.76	1.8962	+15 27 33.3	+12.383	00	03 45 11.42	2.2037	+24 01 57.5	+ 8.601
01	02 09 10.68	1.9011	15 39 54.7	12.331	01	03 47 23.86	2.2111	24 10 30.3	8.492
02	02 11 04.89	1.9062	15 52 13.0	12.277	02	03 49 36.75	2.2185	24 18 56.5	8.382
03	02 12 59.42	1.9113	16 04 28.0	12.222	03	03 51 50.08	2.2259	24 27 16.1	8.269
04	02 14 54.25	1.9165	16 16 39.6	12.166	04	03 54 03.86	2.2334	24 35 28.8	8.155
05	02 16 49.40	1.9218	16 28 47.9	12.109	05	03 56 18.09	2.2408	24 43 34.7	8.041
06	02 18 44.86	1.9272	16 40 52.7	12.051	06	03 58 32.76	2.2483	24 51 33.7	7.925
07	02 20 40.66	1.9326	16 52 54.0	11.992	07	04 00 47.88	2.2557	24 59 25.7	7.807
08	02 22 36.77	1.9380	17 04 51.7	11.932	08	04 03 03.44	2.2632	25 07 10.5	7.688
09	02 24 33.22	1.9437	17 16 45.8	11.870	09	04 05 19.46	2.2706	25 14 48.2	7.568
10	02 26 30.01	1.9493	17 28 36.1	11.808	10	04 07 35.91	2.2780	25 22 18.6	7.446
11	02 28 27.14	1.9550	17 40 22.8	11.746	11	04 09 52.82	2.2855	25 29 41.7	7.323
12	02 30 24.61	1.9607	17 52 05.6	11.682	12	04 12 10.17	2.2928	25 36 57.3	7.198
13	02 32 22.42	1.9665	18 03 44.6	11.617	13	04 14 27.96	2.3003	25 44 05.4	7.072
14	02 34 20.59	1.9724	18 15 19.6	11.550	14	04 16 46.20	2.3077	25 51 05.9	6.944
15	02 36 19.11	1.9784	18 26 50.6	11.483	15	04 19 04.88	2.3151	25 57 58.7	6.815
16	02 38 18.00	1.9844	18 38 17.6	11.415	16	04 21 24.01	2.3224	26 04 43.7	6.684
17	02 40 17.24	1.9904	18 49 40.4	11.345	17	04 23 43.57	2.3297	26 11 20.8	6.553
18	02 42 16.85	1.9967	19 00 59.0	11.275	18	04 26 03.57	2.3370	26 17 50.0	6.419
19	02 44 16.84	2.0028	19 12 13.4	11.203	19	04 28 24.01	2.3443	26 24 11.1	6.284
20	02 46 17.19	2.0090	19 23 23.4	11.130	20	04 30 44.88	2.3514	26 30 24.1	6.148
21	02 48 17.92	2.0154	19 34 29.0	11.057	21	04 33 06.18	2.3586	26 36 28.9	6.010
22	02 50 19.04	2.0218	19 45 30.2	10.983	22	04 35 27.91	2.3658	26 42 25.3	5.872
23	02 52 20.54	2.0282	19 56 26.9	10.906	23	04 37 50.07	2.3728	26 48 13.5	5.732
24	02 54 22.42	2.0347	+20 07 18.9	+10.828	24	04 40 12.65	2.3798	+26 53 53.1	+ 5.589

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Sunday, August 9.					Tuesday, August 11.				
00	04 40 12.65	2.3798	+26 53 53.1	+5.589	00	06 40 55.22	2.6037	+28 15 15.3	-2.580
01	04 42 35.65	2.3869	26 59 24.2	5.447	01	06 43 31.48	2.6050	28 12 34.9	2.769
02	04 44 59.08	2.3938	27 04 46.7	5.302	02	06 46 07.82	2.6062	28 09 43.0	2.958
03	04 47 22.91	2.4007	27 10 00.4	5.156	03	06 48 44.22	2.6071	28 06 39.9	3.148
04	04 49 47.16	2.4076	27 15 05.4	5.008	04	06 51 20.67	2.6079	28 03 25.3	3.338
05	04 52 11.82	2.4143	27 20 01.4	4.860	05	06 53 57.17	2.6086	27 59 59.4	3.527
06	04 54 36.88	2.4209	27 24 48.6	4.710	06	06 56 33.70	2.6091	27 56 22.1	3.716
07	04 57 02.33	2.4275	27 29 26.6	4.558	07	06 59 10.26	2.6095	27 52 33.5	3.905
08	04 59 28.18	2.4341	27 33 55.6	4.406	08	07 01 46.84	2.6097	27 48 33.5	4.095
09	05 01 54.42	2.4406	27 38 15.3	4.252	09	07 04 23.42	2.6097	27 44 22.1	4.284
10	05 04 21.05	2.4470	27 42 25.8	4.097	10	07 07 00.00	2.6096	27 39 59.4	4.473
11	05 06 48.06	2.4533	27 46 26.9	3.939	11	07 09 36.57	2.6093	27 35 25.3	4.663
12	05 09 15.45	2.4596	27 50 18.5	3.782	12	07 12 13.12	2.6089	27 30 39.8	4.853
13	05 11 43.21	2.4657	27 54 00.7	3.623	13	07 14 49.64	2.6083	27 25 43.0	5.041
14	05 14 11.33	2.4718	27 57 33.2	3.462	14	07 17 26.11	2.6075	27 20 34.9	5.230
15	05 16 39.82	2.4777	28 00 56.1	3.301	15	07 20 02.54	2.6067	27 15 15.4	5.418
16	05 19 08.65	2.4835	28 04 09.3	3.138	16	07 22 38.91	2.6057	27 09 44.7	5.607
17	05 21 37.84	2.4893	28 07 12.6	2.973	17	07 25 15.22	2.6044	27 04 02.6	5.794
18	05 24 07.37	2.4949	28 10 06.1	2.808	18	07 27 51.44	2.6031	26 58 09.4	5.981
19	05 26 37.23	2.5004	28 12 49.6	2.642	19	07 30 27.59	2.6017	26 52 04.9	6.168
20	05 29 07.42	2.5058	28 15 23.1	2.474	20	07 33 03.64	2.6000	26 45 49.3	6.353
21	05 31 37.93	2.5112	28 17 46.5	2.305	21	07 35 39.59	2.5983	26 39 22.5	6.539
22	05 34 08.76	2.5163	28 19 59.7	2.135	22	07 38 15.43	2.5963	26 32 44.6	6.723
23	05 36 39.89	2.5214	+28 22 02.7	+1.964	23	07 40 51.15	2.5943	+26 25 55.7	-6.908
Monday, August 10.					Wednesday, August 12.				
00	05 39 11.33	2.5264	+28 23 55.4	+1.793	00	07 43 26.74	2.5921	+26 18 55.6	-7.093
01	05 41 43.06	2.5313	28 25 37.8	1.620	01	07 46 02.20	2.5898	26 11 44.6	7.275
02	05 44 15.08	2.5360	28 27 09.8	1.445	02	07 48 37.52	2.5873	26 04 22.6	7.458
03	05 46 47.38	2.5406	28 28 31.2	1.270	03	07 51 12.68	2.5848	25 56 49.6	7.640
04	05 49 19.95	2.5450	28 29 42.2	1.094	04	07 53 47.69	2.5822	25 49 05.8	7.820
05	05 51 52.78	2.5493	28 30 42.5	0.918	05	07 56 22.54	2.5793	25 41 11.2	8.000
06	05 54 25.87	2.5535	28 31 32.3	0.740	06	07 58 57.21	2.5764	25 33 05.8	8.178
07	05 56 59.20	2.5575	28 32 11.3	0.561	07	08 01 31.71	2.5734	25 24 49.8	8.357
08	05 59 32.77	2.5614	28 32 39.6	0.381	08	08 04 06.02	2.5703	25 16 23.0	8.534
09	06 02 06.57	2.5653	28 32 57.0	0.201	09	08 06 40.14	2.5670	25 07 45.7	8.710
10	06 04 40.60	2.5689	28 33 03.7	+0.020	10	08 09 14.06	2.5636	24 58 57.8	8.885
11	06 07 14.84	2.5723	28 32 59.4	-0.163	11	08 11 47.77	2.5601	24 49 59.5	9.059
12	06 09 49.28	2.5757	28 32 44.2	0.345	12	08 14 21.27	2.5566	24 40 50.7	9.232
13	06 12 23.92	2.5788	28 32 18.0	0.528	13	08 16 54.56	2.5529	24 31 31.6	9.403
14	06 14 58.74	2.5819	28 31 40.8	0.713	14	08 19 27.62	2.5491	24 22 02.3	9.574
15	06 17 33.75	2.5848	28 30 52.5	0.898	15	08 22 00.45	2.5452	24 12 22.7	9.744
16	06 20 08.92	2.5875	28 29 53.1	1.083	16	08 24 33.04	2.5413	24 02 33.0	9.913
17	06 22 44.25	2.5901	28 28 42.6	1.268	17	08 27 05.40	2.5373	23 52 33.2	10.079
18	06 25 19.73	2.5924	28 27 21.0	1.453	18	08 29 37.51	2.5332	23 42 23.5	10.244
19	06 27 55.34	2.5947	28 25 48.2	1.641	19	08 32 09.38	2.5290	23 32 03.9	10.408
20	06 30 31.09	2.5969	28 24 04.1	1.828	20	08 34 40.99	2.5248	23 21 34.5	10.573
21	06 33 06.97	2.5988	28 22 08.8	2.015	21	08 37 12.35	2.5204	23 10 55.3	10.733
22	06 35 42.95	2.6006	28 20 02.3	2.203	22	08 39 43.44	2.5160	23 00 06.5	10.893
23	06 38 19.04	2.6023	28 17 44.5	2.392	23	08 42 14.27	2.5115	22 49 08.1	11.052
24	06 40 55.22	2.6037	+28 15 15.3	-2.580	24	08 44 44.82	2.5069	+22 38 00.2	-11.209

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Thursday, August 13.					Saturday, August 15.				
00	08 44 44.82	2.5069	+22 38 00.2	-11.209	00	10 39 25.30	2.2755	+11 11 25.9	-16.672
01	08 47 15.10	2.5023	22 26 43.0	11.365	01	10 41 41.71	2.2715	10 54 43.6	16.737
02	08 49 45.10	2.4977	22 15 16.4	11.520	02	10 43 57.88	2.2675	10 37 57.5	16.801
03	08 52 14.82	2.4930	22 03 40.6	11.673	03	10 46 13.81	2.2635	10 21 07.5	16.863
04	08 54 44.26	2.4883	21 51 55.7	11.823	04	10 48 29.50	2.2597	10 04 14.0	16.922
05	08 57 13.41	2.4834	21 40 01.8	11.973	05	10 50 44.97	2.2558	9 47 16.9	16.980
06	08 59 42.27	2.4786	21 27 58.9	12.122	06	10 53 00.20	2.2521	9 30 16.4	17.036
07	09 02 10.84	2.4738	21 15 47.2	12.267	07	10 55 15.22	2.2485	9 13 12.6	17.090
08	09 04 39.12	2.4688	21 03 26.9	12.412	08	10 57 30.02	2.2449	8 56 05.6	17.141
09	09 07 07.10	2.4638	20 50 57.8	12.555	09	10 59 44.61	2.2413	8 38 55.7	17.190
10	09 09 34.78	2.4589	20 38 20.3	12.696	10	11 01 58.98	2.2378	8 21 42.8	17.238
11	09 12 02.17	2.4539	20 25 34.3	12.836	11	11 04 13.15	2.2345	8 04 27.1	17.284
12	09 14 29.25	2.4488	20 12 40.0	12.973	12	11 06 27.12	2.2313	7 47 08.7	17.328
13	09 16 56.03	2.4438	19 59 37.5	13.110	13	11 08 40.90	2.2280	7 29 47.8	17.369
14	09 19 22.51	2.4388	19 46 26.8	13.244	14	11 10 54.48	2.2248	7 12 24.4	17.408
15	09 21 48.68	2.4337	19 33 08.2	13.376	15	11 13 07.87	2.2217	6 54 58.8	17.446
16	09 24 14.55	2.4287	19 19 41.7	13.508	16	11 15 21.08	2.2188	6 37 30.9	17.482
17	09 26 40.12	2.4236	19 06 07.3	13.637	17	11 17 34.12	2.2158	6 20 01.0	17.515
18	09 29 05.38	2.4184	18 52 25.3	13.763	18	11 19 46.98	2.2129	6 02 29.1	17.547
19	09 31 30.33	2.4133	18 38 35.8	13.888	19	11 21 59.67	2.2102	5 44 55.3	17.577
20	09 33 54.98	2.4083	18 24 38.8	14.012	20	11 24 12.20	2.2075	5 27 19.9	17.604
21	09 36 19.32	2.4031	18 10 34.4	14.133	21	11 26 24.57	2.2049	5 09 42.8	17.630
22	09 38 43.35	2.3980	17 56 22.8	14.253	22	11 28 36.79	2.2024	4 52 04.3	17.653
23	09 41 07.08	2.3929	+17 42 04.1	-14.371	23	11 30 48.86	2.2000	+ 4 34 24.4	-17.676
Friday, August 14.					Sunday, August 16.				
00	09 43 30.50	2.3878	+17 27 38.3	-14.487	00	11 33 00.79	2.1977	+ 4 16 43.2	-17.696
01	09 45 53.62	2.3828	17 13 05.7	14.600	01	11 35 12.58	2.1953	3 59 00.9	17.713
02	09 48 16.44	2.3778	16 58 26.3	14.712	02	11 37 24.23	2.1932	3 41 17.6	17.729
03	09 50 38.95	2.3727	16 43 40.3	14.822	03	11 39 35.76	2.1911	3 23 33.4	17.743
04	09 53 01.16	2.3677	16 28 47.7	14.930	04	11 41 47.16	2.1891	3 05 48.4	17.755
05	09 55 23.07	2.3628	16 13 48.7	15.036	05	11 43 58.45	2.1872	2 48 02.8	17.765
06	09 57 44.69	2.3578	15 58 43.4	15.140	06	11 46 09.62	2.1853	2 30 16.6	17.774
07	10 00 06.00	2.3528	15 43 31.9	15.243	07	11 48 20.68	2.1835	2 12 29.9	17.780
08	10 02 27.03	2.3480	15 28 14.3	15.343	08	11 50 31.64	2.1819	1 54 43.0	17.784
09	10 04 47.76	2.3431	15 12 50.8	15.441	09	11 52 42.51	2.1803	1 36 55.8	17.787
10	10 07 08.20	2.3383	14 57 21.4	15.537	10	11 54 53.28	2.1788	1 19 08.5	17.788
11	10 09 28.35	2.3335	14 41 46.4	15.631	11	11 57 03.96	2.1773	1 01 21.3	17.787
12	10 11 48.22	2.3288	14 26 05.7	15.723	12	11 59 14.56	2.1760	0 43 34.1	17.784
13	10 14 07.80	2.3241	14 10 19.6	15.813	13	12 01 25.08	2.1748	0 25 47.2	17.779
14	10 16 27.11	2.3194	13 54 28.1	15.902	14	12 03 35.54	2.1737	+ 0 08 00.6	17.772
15	10 18 46.13	2.3148	13 38 31.4	15.988	15	12 05 45.92	2.1726	- 0 09 45.5	17.763
16	10 21 04.88	2.3102	13 22 29.6	16.072	16	12 07 56.25	2.1716	0 27 31.0	17.753
17	10 23 23.35	2.3056	13 06 22.8	16.153	17	12 10 06.51	2.1707	0 45 15.8	17.741
18	10 25 41.55	2.3012	12 50 11.2	16.233	18	12 12 16.73	2.1699	1 02 59.9	17.728
19	10 27 59.49	2.2968	12 33 54.8	16.312	19	12 14 26.90	2.1692	1 20 43.1	17.712
20	10 30 17.17	2.2924	12 17 33.8	16.388	20	12 16 37.03	2.1686	1 38 25.3	17.693
21	10 32 34.58	2.2881	12 01 08.2	16.463	21	12 18 47.13	2.1680	1 56 06.3	17.673
22	10 34 51.74	2.2839	11 44 38.3	16.533	22	12 20 57.19	2.1675	2 13 46.1	17.653
23	10 37 08.65	2.2797	11 28 04.2	16.603	23	12 23 07.23	2.1672	2 31 24.6	17.630
24	10 39 25.30	2.2755	+11 11 25.9	-16.672	24	12 25 17.25	2.1668	- 2 49 01.7	-17.605

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Monday, August 17.					Wednesday, August 19.				
00	12 25 17.25	2.1668	— 2 49 01.7	— 17.605	00	14 10 30.10	2.2447	— 15 53 46.2	— 14.488
01	12 27 27.25	2.1667	3 06 37.2	17.578	01	14 12 44.87	2.2478	16 08 12.5	14.387
02	12 29 37.25	2.1666	3 24 11.1	17.551	02	14 14 59.84	2.2512	16 22 32.6	14.283
03	12 31 47.24	2.1666	3 41 43.3	17.521	03	14 17 15.01	2.2544	16 36 46.5	14.179
04	12 33 57.24	2.1667	3 59 13.6	17.488	04	14 19 30.37	2.2577	16 50 54.1	14.073
05	12 36 07.24	2.1668	4 16 41.9	17.454	05	14 21 45.93	2.2610	17 04 55.2	13.965
06	12 38 17.25	2.1669	4 34 08.1	17.419	06	14 24 01.69	2.2644	17 18 49.9	13.858
07	12 40 27.27	2.1673	4 51 32.2	17.383	07	14 26 17.66	2.2678	17 32 38.1	13.748
08	12 42 37.32	2.1678	5 08 54.1	17.344	08	14 28 33.83	2.2713	17 46 19.6	13.636
09	12 44 47.40	2.1682	5 26 13.5	17.303	09	14 30 50.21	2.2748	17 59 54.4	13.523
10	12 46 57.50	2.1687	5 43 30.5	17.262	10	14 33 06.80	2.2783	18 13 22.4	13.409
11	12 49 07.64	2.1693	6 00 44.9	17.218	11	14 35 23.60	2.2818	18 26 43.5	13.294
12	12 51 17.82	2.1701	6 17 56.6	17.172	12	14 37 40.62	2.2854	18 39 57.7	13.178
13	12 53 28.05	2.1708	6 35 05.5	17.125	13	14 39 57.85	2.2889	18 53 04.9	13.060
14	12 55 38.32	2.1718	6 52 11.6	17.077	14	14 42 15.29	2.2926	19 06 04.9	12.941
15	12 57 48.66	2.1728	7 09 14.7	17.026	15	14 44 32.96	2.2963	19 18 57.8	12.821
16	12 59 59.05	2.1738	7 26 14.7	16.973	16	14 46 50.84	2.2999	19 31 43.4	12.699
17	13 02 09.52	2.1750	7 43 11.5	16.920	17	14 49 08.95	2.3036	19 44 21.7	12.577
18	13 04 20.05	2.1761	8 00 05.1	16.865	18	14 51 27.27	2.3072	19 56 52.6	12.453
19	13 06 30.65	2.1774	8 16 55.3	16.808	19	14 53 45.81	2.3109	20 09 16.0	12.328
20	13 08 41.34	2.1788	8 33 42.1	16.750	20	14 56 04.58	2.3147	20 21 31.9	12.202
21	13 10 52.11	2.1802	8 50 25.3	16.689	21	14 58 23.57	2.3183	20 33 40.2	12.074
22	13 13 02.96	2.1817	9 07 04.8	16.628	22	15 00 42.78	2.3220	20 45 40.8	11.945
23	13 15 13.91	2.1833	— 9 23 40.6	— 16.564	23	15 03 02.21	2.3258	— 20 57 33.6	— 11.815
Tuesday, August 18.					Thursday, August 20.				
00	13 17 24.96	2.1850	— 9 40 12.5	— 16.499	00	15 05 21.87	2.3295	— 21 09 18.6	— 11.684
01	13 19 36.11	2.1868	9 56 40.5	16.433	01	15 07 41.75	2.3333	21 20 55.7	11.553
02	13 21 47.37	2.1885	10 13 04.4	16.365	02	15 10 01.86	2.3369	21 32 24.9	11.419
03	13 23 58.73	2.1904	10 29 24.3	16.296	03	15 12 22.18	2.3406	21 43 46.0	11.284
04	13 26 10.22	2.1924	10 45 39.9	16.224	04	15 14 42.73	2.3444	21 54 59.0	11.149
05	13 28 21.82	2.1944	11 01 51.2	16.152	05	15 17 03.51	2.3481	22 06 03.9	11.013
06	13 30 33.55	2.1965	11 17 58.1	16.078	06	15 19 24.50	2.3517	22 17 00.5	10.874
07	13 32 45.40	2.1987	11 34 00.5	16.002	07	15 21 45.71	2.3553	22 27 48.8	10.736
08	13 34 57.39	2.2009	11 49 58.3	15.924	08	15 24 07.14	2.3590	22 38 28.8	10.597
09	13 37 09.51	2.2032	12 05 51.4	15.846	09	15 26 28.79	2.3627	22 49 00.4	10.456
10	13 39 21.77	2.2055	12 21 39.8	15.766	10	15 28 50.66	2.3663	22 59 23.5	10.314
11	13 41 34.17	2.2079	12 37 23.3	15.683	11	15 31 12.74	2.3698	23 09 38.1	10.171
12	13 43 46.72	2.2104	12 53 01.8	15.600	12	15 33 35.04	2.3734	23 19 44.0	10.027
13	13 45 59.42	2.2130	13 08 35.3	15.516	13	15 35 57.55	2.3769	23 29 41.3	9.883
14	13 48 12.28	2.2156	13 24 03.7	15.429	14	15 38 20.27	2.3804	23 39 29.9	9.737
15	13 50 25.29	2.2183	13 39 26.8	15.342	15	15 40 43.20	2.3838	23 49 09.7	9.590
16	13 52 38.47	2.2210	13 54 44.7	15.253	16	15 43 06.33	2.3873	23 58 40.7	9.443
17	13 54 51.81	2.2238	14 09 57.1	15.162	17	15 45 29.67	2.3908	24 08 02.8	9.293
18	13 57 05.32	2.2267	14 25 04.1	15.070	18	15 47 53.22	2.3940	24 17 15.9	9.143
19	13 59 19.01	2.2295	14 40 05.5	14.977	19	15 50 16.95	2.3973	24 26 20.0	8.993
20	14 01 32.86	2.2324	14 55 01.3	14.883	20	15 52 40.89	2.4006	24 35 15.0	8.842
21	14 03 46.90	2.2354	15 09 51.4	14.786	21	15 55 05.02	2.4038	24 44 01.0	8.691
22	14 06 01.11	2.2384	15 24 35.6	14.688	22	15 57 29.34	2.4069	24 52 37.9	8.538
23	14 08 15.51	2.2416	15 39 13.9	14.588	23	15 59 53.85	2.4100	25 01 05.5	8.383
24	14 10 30.10	2.2447	— 15 53 46.2	— 14.488	24	16 02 18.54	2.4130	— 25 09 23.9	— 8.229

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Friday, August 21.					Sunday, August 23.				
00	16 02 18.54	2.4130	-25 09 23.9	-8.229	00	18 00 04.05	2.4543	-28 36 22.5	-0.303
01	16 04 43.41	2.4160	25 17 33.0	8.073	01	18 02 31.25	2.4524	28 36 35.7	-0.138
02	16 07 08.46	2.4190	25 25 32.7	7.918	02	18 04 58.34	2.4505	28 36 39.0	+0.028
03	16 09 33.69	2.4218	25 33 23.1	7.761	03	18 07 25.31	2.4484	28 36 32.4	0.193
04	16 11 59.08	2.4246	25 41 04.0	7.603	04	18 09 52.15	2.4462	28 36 15.8	0.358
05	16 14 24.64	2.4273	25 48 35.5	7.446	05	18 12 18.85	2.4438	28 35 49.4	0.523
06	16 16 50.36	2.4299	25 55 57.5	7.287	06	18 14 45.41	2.4415	28 35 13.1	0.686
07	16 19 16.23	2.4325	26 03 09.9	7.127	07	18 17 11.83	2.4390	28 34 27.1	0.848
08	16 21 42.26	2.4351	26 10 12.7	6.967	08	18 19 38.09	2.4363	28 33 31.3	1.012
09	16 24 08.44	2.4374	26 17 05.9	6.806	09	18 22 04.18	2.4335	28 32 25.7	1.174
10	16 26 34.75	2.4398	26 23 49.4	6.644	10	18 24 30.11	2.4308	28 31 10.4	1.336
11	16 29 01.21	2.4421	26 30 23.2	6.483	11	18 26 55.87	2.4278	28 29 45.4	1.498
12	16 31 27.80	2.4443	26 36 47.3	6.320	12	18 29 21.44	2.4246	28 28 10.7	1.658
13	16 33 54.52	2.4463	26 43 01.6	6.157	13	18 31 46.82	2.4214	28 26 26.5	1.818
14	16 36 21.36	2.4483	26 49 06.1	5.993	14	18 34 12.01	2.4181	28 24 32.6	1.977
15	16 38 48.32	2.4503	26 55 00.8	5.829	15	18 36 36.99	2.4147	28 22 29.3	2.134
16	16 41 15.40	2.4522	27 00 45.6	5.665	16	18 39 01.77	2.4112	28 20 16.5	2.293
17	16 43 42.58	2.4538	27 06 20.6	5.500	17	18 41 26.33	2.4076	28 17 54.2	2.450
18	16 46 09.86	2.4555	27 11 45.6	5.334	18	18 43 50.68	2.4039	28 15 22.5	2.607
19	16 48 37.24	2.4571	27 17 00.7	5.169	19	18 46 14.80	2.4001	28 12 41.4	2.762
20	16 51 04.71	2.4585	27 22 05.9	5.003	20	18 48 38.69	2.3962	28 09 51.1	2.916
21	16 53 32.26	2.4598	27 27 01.1	4.837	21	18 51 02.34	2.3923	28 06 51.5	3.071
22	16 55 59.89	2.4611	27 31 46.3	4.670	22	18 53 25.76	2.3882	28 03 42.6	3.224
23	16 58 27.59	2.4623	-27 36 21.5	-4.503	23	18 55 48.92	2.3839	-28 00 24.6	+3.376
Saturday, August 22.					Monday, August 24.				
00	17 00 55.36	2.4633	-27 40 46.6	-4.335	00	18 58 11.83	2.3797	-27 56 57.5	+3.528
01	17 03 23.19	2.4643	27 45 01.7	4.168	01	19 00 34.48	2.3753	27 53 21.3	3.678
02	17 05 51.07	2.4651	27 49 06.7	4.000	02	19 02 56.87	2.3709	27 49 36.2	3.828
03	17 08 19.00	2.4658	27 53 01.7	3.832	03	19 05 18.99	2.3664	27 45 42.0	3.977
04	17 10 46.96	2.4663	27 56 46.5	3.663	04	19 07 40.84	2.3618	27 41 39.0	4.125
05	17 13 14.96	2.4668	28 00 21.3	3.496	05	19 10 02.40	2.3571	27 37 27.0	4.273
06	17 15 42.98	2.4673	28 03 46.0	3.327	06	19 12 23.69	2.3524	27 33 06.3	4.418
07	17 18 11.03	2.4676	28 07 00.5	3.158	07	19 14 44.69	2.3475	27 28 36.9	4.563
08	17 20 39.09	2.4677	28 10 05.0	2.990	08	19 17 05.39	2.3426	27 23 58.8	4.708
09	17 23 07.15	2.4677	28 12 59.3	2.821	09	19 19 25.80	2.3377	27 19 12.0	4.851
10	17 25 35.21	2.4677	28 15 43.5	2.653	10	19 21 45.91	2.3326	27 14 16.7	4.993
11	17 28 03.27	2.4675	28 18 17.6	2.484	11	19 24 05.71	2.3275	27 09 12.9	5.133
12	17 30 31.31	2.4672	28 20 41.6	2.315	12	19 26 25.21	2.3223	27 04 00.7	5.273
13	17 32 59.33	2.4668	28 22 55.4	2.147	13	19 28 44.39	2.3171	26 58 40.1	5.413
14	17 35 27.32	2.4662	28 24 59.2	1.978	14	19 31 03.26	2.3118	26 53 11.1	5.552
15	17 37 55.27	2.4655	28 26 52.8	1.810	15	19 33 21.80	2.3064	26 47 33.9	5.688
16	17 40 23.18	2.4648	28 28 36.4	1.642	16	19 35 40.03	2.3010	26 41 48.5	5.824
17	17 42 51.04	2.4638	28 30 09.8	1.473	17	19 37 57.92	2.2955	26 35 55.0	5.959
18	17 45 18.84	2.4628	28 31 33.2	1.306	18	19 40 15.49	2.2901	26 29 53.4	6.093
19	17 47 46.58	2.4617	28 32 46.5	1.138	19	19 42 32.73	2.2845	26 23 43.9	6.225
20	17 50 14.24	2.4604	28 33 49.7	0.971	20	19 44 49.63	2.2788	26 17 26.4	6.358
21	17 52 41.83	2.4591	28 34 43.0	0.803	21	19 47 06.19	2.2733	26 11 01.0	6.488
22	17 55 09.33	2.4576	28 35 26.1	0.636	22	19 49 22.42	2.2676	26 04 27.8	6.618
23	17 57 36.74	2.4560	28 35 59.3	0.470	23	19 51 38.30	2.2618	25 57 46.9	6.746
24	18 00 04.05	2.4543	-28 36 22.5	-0.303	24	19 53 53.83	2.2560	-25 50 58.3	+6.873

MOON, 1931.

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THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Tuesday, August 25.					Thursday, August 27.				
00	19 53 53.83	2.2560	-25 50 58.3	+6.873	00	21 35 19.05	1.9739	-18 16 48.9	+11.599
01	19 56 09.02	2.2503	25 44 02.1	6.999	01	21 37 17.33	1.9686	18 05 10.8	11.670
02	19 58 23.86	2.2443	25 36 58.4	7.124	02	21 39 15.28	1.9633	17 53 28.5	11.738
03	20 00 38.34	2.2385	25 29 47.2	7.248	03	21 41 12.92	1.9581	17 41 42.2	11.807
04	20 02 52.48	2.2327	25 22 28.7	7.370	04	21 43 10.25	1.9529	17 29 51.7	11.874
05	20 05 06.26	2.2267	25 15 02.8	7.492	05	21 45 07.27	1.9478	17 17 57.3	11.939
06	20 07 19.68	2.2208	25 07 29.7	7.612	06	21 47 03.99	1.9428	17 05 59.0	12.004
07	20 09 32.75	2.2148	24 59 49.4	7.731	07	21 49 00.40	1.9377	16 53 56.8	12.068
08	20 11 45.46	2.2088	24 52 02.0	7.849	08	21 50 56.51	1.9327	16 41 50.9	12.130
09	20 13 57.80	2.2028	24 44 07.5	7.966	09	21 52 52.32	1.9278	16 29 41.2	12.193
10	20 16 09.79	2.1968	24 36 06.1	8.081	10	21 54 47.84	1.9228	16 17 27.8	12.253
11	20 18 21.41	2.1907	24 27 57.8	8.196	11	21 56 43.06	1.9180	16 05 10.9	12.312
12	20 20 32.67	2.1847	24 19 42.6	8.309	12	21 58 38.00	1.9133	15 52 50.4	12.371
13	20 22 43.57	2.1786	24 11 20.7	8.421	13	22 00 32.65	1.9085	15 40 26.4	12.428
14	20 24 54.10	2.1725	24 02 52.1	8.532	14	22 02 27.02	1.9038	15 27 59.1	12.484
15	20 27 04.27	2.1664	23 54 16.9	8.642	15	22 04 21.11	1.8993	15 15 28.3	12.540
16	20 29 14.07	2.1603	23 45 35.1	8.750	16	22 06 14.93	1.8947	15 02 54.3	12.593
17	20 31 23.51	2.1543	23 36 46.9	8.857	17	22 08 08.47	1.8901	14 50 17.1	12.647
18	20 33 32.59	2.1483	23 27 52.3	8.963	18	22 10 01.74	1.8857	14 37 36.7	12.700
19	20 35 41.30	2.1421	23 18 51.3	9.068	19	22 11 54.75	1.8813	14 24 53.1	12.752
20	20 37 49.64	2.1361	23 09 44.1	9.172	20	22 13 47.50	1.8770	14 12 06.5	12.802
21	20 39 57.63	2.1300	23 00 30.7	9.274	21	22 15 39.99	1.8727	13 59 16.9	12.851
22	20 42 05.24	2.1238	22 51 11.2	9.376	22	22 17 32.22	1.8685	13 46 24.4	12.898
23	20 44 12.49	2.1178	-22 41 45.6	+9.476	23	22 19 24.21	1.8643	-13 33 29.1	+12.946
Wednesday, August 26.					Friday, August 28.				
00	20 46 19.38	2.1118	-22 32 14.1	+9.574	00	22 21 15.94	1.8602	-13 20 30.9	+12.993
01	20 48 25.91	2.1058	22 22 36.7	9.673	01	22 23 07.43	1.8562	13 07 29.9	13.038
02	20 50 32.08	2.0998	22 12 53.4	9.769	02	22 24 58.68	1.8522	12 54 26.3	13.083
03	20 52 37.88	2.0938	22 03 04.4	9.865	03	22 26 49.69	1.8483	12 41 20.0	13.126
04	20 54 43.33	2.0878	21 53 09.6	9.959	04	22 28 40.47	1.8444	12 28 11.2	13.168
05	20 56 48.42	2.0818	21 43 09.3	10.051	05	22 30 31.02	1.8406	12 14 59.8	13.211
06	20 58 53.15	2.0759	21 33 03.5	10.143	06	22 32 21.34	1.8368	12 01 45.9	13.252
07	21 00 57.53	2.0700	21 22 52.1	10.234	07	22 34 11.44	1.8332	11 48 29.6	13.291
08	21 03 01.55	2.0641	21 12 35.4	10.323	08	22 36 01.32	1.8295	11 35 11.0	13.330
09	21 05 05.22	2.0582	21 02 13.3	10.412	09	22 37 50.98	1.8259	11 21 50.0	13.368
10	21 07 08.53	2.0523	20 51 45.9	10.499	10	22 39 40.43	1.8225	11 08 26.8	13.405
11	21 09 11.50	2.0465	20 41 13.4	10.585	11	22 41 29.68	1.8191	10 55 01.4	13.441
12	21 11 14.11	2.0407	20 30 35.7	10.670	12	22 43 18.72	1.8157	10 41 33.9	13.476
13	21 13 16.38	2.0350	20 19 53.0	10.754	13	22 45 07.56	1.8123	10 28 04.3	13.511
14	21 15 18.31	2.0293	20 09 05.2	10.837	14	22 46 56.20	1.8091	10 14 32.6	13.544
15	21 17 19.89	2.0235	19 58 12.6	10.918	15	22 48 44.65	1.8060	10 00 59.0	13.577
16	21 19 21.13	2.0178	19 47 15.1	10.998	16	22 50 32.92	1.8029	9 47 23.4	13.608
17	21 21 22.03	2.0123	19 36 12.9	11.077	17	22 52 21.00	1.7998	9 33 46.0	13.639
18	21 23 22.60	2.0067	19 25 05.9	11.155	18	22 54 08.89	1.7968	9 20 06.7	13.670
19	21 25 22.83	2.0011	19 13 54.3	11.232	19	22 55 56.61	1.7939	9 06 25.6	13.698
20	21 27 22.73	1.9956	19 02 38.1	11.308	20	22 57 44.16	1.7911	8 52 42.9	13.727
21	21 29 22.30	1.9901	18 51 17.4	11.382	21	22 59 31.54	1.7883	8 38 58.4	13.754
22	21 31 21.54	1.9847	18 39 52.3	11.456	22	23 01 18.75	1.7855	8 25 12.4	13.780
23	21 33 20.46	1.9793	18 28 22.7	11.528	23	23 03 05.80	1.7828	8 11 24.8	13.806
24	21 35 19.05	1.9739	-18 16 48.9	+11.599	24	23 04 52.69	1.7803	-7 57 35.7	+13.831

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Saturday, August 29.					Monday, August 31.				
00	23 04 52.69	1.7803	- 7 57 35.7	+13.831	00	00 28 37.53	1.7354	+ 3 19 48.3	+14.104
01	23 06 39.43	1.7778	7 43 45.1	13.855	01	00 30 21.68	1.7363	3 33 54.2	14.091
02	23 08 26.02	1.7753	7 29 53.1	13.878	02	00 32 05.88	1.7371	3 47 59.2	14.078
03	23 10 12.46	1.7729	7 15 59.8	13.900	03	00 33 50.13	1.7379	4 02 03.5	14.064
04	23 11 58.77	1.7706	7 02 05.1	13.922	04	00 35 34.43	1.7389	4 16 06.9	14.049
05	23 13 44.93	1.7683	6 48 09.2	13.943	05	00 37 18.80	1.7400	4 30 09.4	14.034
06	23 15 30.96	1.7661	6 34 12.0	13.963	06	00 39 03.23	1.7411	4 44 11.0	14.018
07	23 17 16.86	1.7640	6 20 13.7	13.981	07	00 40 47.73	1.7423	4 58 11.6	14.001
08	23 19 02.64	1.7619	6 06 14.3	13.999	08	00 42 32.30	1.7435	5 12 11.1	13.983
09	23 20 48.29	1.7599	5 52 13.8	14.017	09	00 44 16.95	1.7448	5 26 09.6	13.966
10	23 22 33.83	1.7581	5 38 12.3	14.033	10	00 46 01.68	1.7462	5 40 07.0	13.947
11	23 24 19.26	1.7562	5 24 09.8	14.049	11	00 47 46.49	1.7476	5 54 03.2	13.927
12	23 26 04.57	1.7543	5 10 06.4	14.064	12	00 49 31.39	1.7492	6 07 58.2	13.907
13	23 27 49.78	1.7527	4 56 02.1	14.079	13	00 51 16.39	1.7508	6 21 52.0	13.885
14	23 29 34.89	1.7510	4 41 56.9	14.093	14	00 53 01.48	1.7524	6 35 44.4	13.863
15	23 31 19.90	1.7494	4 27 51.0	14.105	15	00 54 46.68	1.7542	6 49 35.5	13.841
16	23 33 04.82	1.7479	4 13 44.3	14.117	16	00 56 31.98	1.7559	7 03 25.3	13.818
17	23 34 49.65	1.7465	3 59 37.0	14.128	17	00 58 17.39	1.7578	7 17 13.6	13.793
18	23 36 34.40	1.7451	3 45 28.9	14.139	18	01 00 02.92	1.7598	7 31 00.5	13.768
19	23 38 19.06	1.7437	3 31 20.3	14.148	19	01 01 48.56	1.7618	7 44 45.8	13.743
20	23 40 03.64	1.7424	3 17 11.2	14.157	20	01 03 34.33	1.7639	7 58 29.6	13.717
21	23 41 48.15	1.7413	3 03 01.5	14.165	21	01 05 20.23	1.7660	8 12 11.8	13.689
22	23 43 32.59	1.7402	2 48 51.4	14.173	22	01 07 06.25	1.7682	8 25 52.3	13.662
23	23 45 16.97	1.7392	- 2 34 40.8	+14.179	23	01 08 52.41	1.7705	+ 8 39 31.2	+13.633
Sunday, August 30.					Tuesday, September 1.				
00	23 47 01.29	1.7382	- 2 20 29.9	+14.185	00	01 10 38.71	1.7728	+ 8 53 03.3	+13.604
01	23 48 45.55	1.7373	2 06 18.6	14.190	01	01 12 25.15	1.7753	9 06 43.7	13.574
02	23 50 29.76	1.7365	1 52 07.1	14.194	02	01 14 11.74	1.7778	9 20 17.2	13.543
03	23 52 13.93	1.7357	1 37 55.3	14.198	03	01 15 58.48	1.7803	9 33 48.8	13.512
04	23 53 58.04	1.7349	1 23 43.3	14.201	04	01 17 45.38	1.7830	9 47 18.6	13.479
05	23 55 42.12	1.7343	1 09 31.2	14.203	05	01 19 32.44	1.7858	10 00 46.3	13.446
06	23 57 26.16	1.7338	0 55 19.0	14.204	06	01 21 19.67	1.7885	10 14 12.1	13.413
07	23 59 10.18	1.7333	0 41 06.7	14.205	07	01 23 07.06	1.7913	10 27 35.8	13.378
08	00 00 54.16	1.7328	0 26 54.4	14.204	08	01 24 54.63	1.7943	10 40 57.4	13.343
09	00 02 38.12	1.7325	- 0 12 42.2	14.203	09	01 26 42.37	1.7972	10 54 16.9	13.307
10	00 04 22.06	1.7323	+ 0 01 30.0	14.203	10	01 28 30.29	1.8003	11 07 34.2	13.269
11	00 06 05.99	1.7320	0 15 42.1	14.200	11	01 30 18.40	1.8034	11 20 49.2	13.231
12	00 07 49.90	1.7318	0 29 54.0	14.197	12	01 32 06.70	1.8066	11 34 01.9	13.193
13	00 09 33.81	1.7318	0 44 05.7	14.193	13	01 33 55.19	1.8098	11 47 12.3	13.153
14	00 11 17.71	1.7318	0 58 17.1	14.188	14	01 35 43.88	1.8132	12 00 20.3	13.113
15	00 13 01.62	1.7318	1 12 28.3	14.183	15	01 37 32.77	1.8166	12 13 25.9	13.073
16	00 14 45.53	1.7320	1 26 39.1	14.177	16	01 39 21.87	1.8201	12 26 29.0	13.030
17	00 16 29.46	1.7322	1 40 49.5	14.170	17	01 41 11.18	1.8236	12 39 29.5	12.988
18	00 18 13.39	1.7324	1 54 59.5	14.163	18	01 43 00.70	1.8272	12 52 27.5	12.944
19	00 19 57.35	1.7328	2 09 09.1	14.155	19	01 44 50.44	1.8308	13 05 22.8	12.900
20	00 21 41.32	1.7332	2 23 18.1	14.146	20	01 46 40.40	1.8346	13 18 15.5	12.855
21	00 23 25.33	1.7337	2 37 26.6	14.137	21	01 48 30.59	1.8384	13 31 05.4	12.808
22	00 25 09.36	1.7342	2 51 34.5	14.126	22	01 50 21.01	1.8423	13 43 52.5	12.763
23	00 26 53.43	1.7348	3 05 41.7	14.115	23	01 52 11.66	1.8462	13 56 36.9	12.715
24	00 28 37.53	1.7354	+ 3 19 48.3	+14.104	24	01 54 02.55	1.8502	+14 09 18.3	+12.666

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Wednesday, September 2.					Friday, September 4.				
00	01 54 02.55	1.8502	+14 09 18.3	+12.666	00	03 28 37.50	2.1111	+23 03 46.0	+9.213
01	01 55 53.68	1.8543	14 21 56.8	12.617	01	03 30 44.36	2.1177	23 12 55.9	9.115
02	01 57 45.06	1.8584	14 34 32.3	12.567	02	03 32 51.62	2.1243	23 21 59.8	9.016
03	01 59 36.69	1.8626	14 47 04.8	12.515	03	03 34 59.27	2.1308	23 30 57.8	8.916
04	02 01 28.57	1.8668	14 59 34.1	12.463	04	03 37 07.32	2.1374	23 39 49.7	8.813
05	02 03 20.71	1.8712	15 12 00.4	12.412	05	03 39 15.76	2.1441	23 48 35.4	8.710
06	02 05 13.11	1.8756	15 24 23.5	12.358	06	03 41 24.61	2.1508	23 57 14.9	8.606
07	02 07 05.78	1.8801	15 36 43.3	12.303	07	03 43 33.85	2.1574	24 05 48.1	8.501
08	02 08 58.72	1.8846	15 48 59.8	12.247	08	03 45 43.50	2.1641	24 14 15.0	8.394
09	02 10 51.93	1.8892	16 01 12.9	12.190	09	03 47 53.54	2.1708	24 22 35.4	8.287
10	02 12 45.42	1.8938	16 13 22.6	12.133	10	03 50 03.99	2.1775	24 30 49.4	8.178
11	02 14 39.19	1.8985	16 25 28.9	12.075	11	03 52 14.84	2.1842	24 38 56.7	8.067
12	02 16 33.24	1.9033	16 37 31.6	12.016	12	03 54 26.09	2.1909	24 46 57.4	7.956
13	02 18 27.58	1.9081	16 49 30.8	11.956	13	03 56 37.75	2.1977	24 54 51.4	7.843
14	02 20 22.21	1.9130	17 01 26.3	11.895	14	03 58 49.81	2.2043	25 02 38.6	7.729
15	02 22 17.14	1.9180	17 13 18.2	11.833	15	04 01 02.27	2.2111	25 10 18.9	7.613
16	02 24 12.37	1.9230	17 25 06.3	11.770	16	04 03 15.14	2.2179	25 17 52.2	7.497
17	02 26 07.90	1.9281	17 36 50.6	11.706	17	04 05 28.42	2.2247	25 25 18.5	7.380
18	02 28 03.74	1.9333	17 48 31.0	11.641	18	04 07 42.10	2.2313	25 32 37.8	7.261
19	02 29 59.89	1.9384	18 00 07.5	11.576	19	04 09 56.18	2.2381	25 39 49.8	7.140
20	02 31 56.35	1.9437	18 11 40.1	11.509	20	04 12 10.67	2.2448	25 46 54.6	7.019
21	02 33 53.13	1.9490	18 23 08.6	11.441	21	04 14 25.55	2.2514	25 53 52.1	6.897
22	02 35 50.23	1.9544	18 34 33.0	11.373	22	04 16 40.84	2.2582	26 00 42.2	6.773
23	02 37 47.66	1.9598	+18 45 53.3	+11.303	23	04 18 56.53	2.2648	+26 07 24.8	+6.648
Thursday, September 3.					Saturday, September 5.				
00	02 39 45.41	1.9653	+18 57 09.3	+11.232	00	04 21 12.62	2.2714	+26 13 59.9	+6.522
01	02 41 43.49	1.9708	19 08 21.1	11.160	01	04 23 29.10	2.2781	26 20 27.4	6.393
02	02 43 41.91	1.9765	19 19 28.5	11.087	02	04 25 45.99	2.2848	26 26 47.1	6.264
03	02 45 40.67	1.9822	19 30 31.5	11.013	03	04 28 03.27	2.2913	26 32 59.1	6.135
04	02 47 39.77	1.9878	19 41 30.1	10.939	04	04 30 20.94	2.2978	26 39 03.3	6.003
05	02 49 39.21	1.9936	19 52 24.2	10.863	05	04 32 39.01	2.3043	26 44 59.5	5.870
06	02 51 39.00	1.9994	20 03 13.6	10.786	06	04 34 57.46	2.3108	26 50 47.7	5.737
07	02 53 39.14	2.0052	20 13 58.5	10.708	07	04 37 16.30	2.3173	26 56 27.9	5.602
08	02 55 39.62	2.0111	20 24 38.6	10.628	08	04 39 35.53	2.3237	27 01 59.9	5.466
09	02 57 40.47	2.0171	20 35 13.9	10.548	09	04 41 55.14	2.3300	27 07 23.8	5.328
10	02 59 41.67	2.0230	20 45 44.4	10.468	10	04 44 15.13	2.3363	27 12 39.3	5.189
11	03 01 43.23	2.0291	20 56 10.0	10.385	11	04 46 35.50	2.3427	27 17 46.5	5.049
12	03 03 45.16	2.0352	21 06 30.6	10.302	12	04 48 56.25	2.3489	27 22 45.2	4.908
13	03 05 47.45	2.0413	21 16 46.2	10.218	13	04 51 17.37	2.3550	27 27 35.4	4.766
14	03 07 50.11	2.0474	21 26 56.7	10.132	14	04 53 38.85	2.3612	27 32 17.1	4.623
15	03 09 53.14	2.0536	21 37 02.0	10.044	15	04 56 00.71	2.3673	27 36 50.1	4.477
16	03 11 56.54	2.0599	21 47 02.0	9.957	16	04 58 22.92	2.3733	27 41 14.3	4.331
17	03 14 00.33	2.0663	21 56 56.8	9.868	17	05 00 45.50	2.3793	27 45 29.8	4.184
18	03 16 04.49	2.0725	22 06 46.2	9.778	18	05 03 08.43	2.3851	27 49 36.4	4.036
19	03 18 09.03	2.0788	22 16 30.2	9.687	19	05 05 31.71	2.3908	27 53 34.1	3.887
20	03 20 13.95	2.0853	22 26 08.7	9.594	20	05 07 55.33	2.3966	27 57 22.8	3.737
21	03 22 19.26	2.0917	22 35 41.5	9.501	21	05 10 19.30	2.4023	28 01 02.5	3.585
22	03 24 24.95	2.0981	22 45 08.8	9.407	22	05 12 43.61	2.4079	28 04 33.0	3.432
23	03 26 31.03	2.1046	22 54 30.3	9.310	23	05 15 08.25	2.4134	28 07 54.3	3.278
24	03 28 37.50	2.1111	+23 03 46.0	+9.213	24	05 17 33.22	2.4189	+28 11 06.3	+3.123

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Sunday, September 6.					Tuesday, September 8.				
00	05 17 33.22	2.4189	+28 11 06.3	+ 3.123	00	07 17 55.58	2.5495	+27 26 11.7	- 5.209
01	05 19 58.52	2.4243	28 14 09.0	2.968	01	07 20 28.54	2.5492	27 20 53.7	5.391
02	05 22 24.13	2.4295	28 17 02.4	2.810	02	07 23 01.48	2.5486	27 15 24.8	5.573
03	05 24 50.06	2.4348	28 19 46.2	2.651	03	07 25 34.37	2.5478	27 09 45.0	5.753
04	05 27 16.30	2.4398	28 22 20.5	2.493	04	07 28 07.22	2.5472	27 03 54.4	5.934
05	05 29 42.84	2.4448	28 24 45.3	2.333	05	07 30 40.03	2.5463	26 57 52.9	6.114
06	05 32 09.68	2.4498	28 27 00.4	2.171	06	07 33 12.77	2.5452	26 51 40.7	6.294
07	05 34 36.81	2.4545	28 29 05.8	2.008	07	07 35 45.45	2.5441	26 45 17.6	6.475
08	05 37 04.22	2.4593	28 31 01.4	1.845	08	07 38 18.06	2.5428	26 38 43.7	6.653
09	05 39 31.92	2.4638	28 32 47.2	1.682	09	07 40 50.59	2.5415	26 31 59.2	6.833
10	05 41 59.88	2.4683	28 34 23.2	1.517	10	07 43 23.04	2.5400	26 25 03.8	7.012
11	05 44 28.12	2.4728	28 35 49.2	1.350	11	07 45 55.39	2.5384	26 17 57.8	7.189
12	05 46 56.62	2.4772	28 37 05.2	1.183	12	07 48 27.65	2.5368	26 10 41.1	7.367
13	05 49 25.38	2.4813	28 38 11.2	1.016	13	07 50 59.80	2.5349	26 03 13.8	7.544
14	05 51 54.38	2.4853	28 39 07.1	0.847	14	07 53 31.84	2.5330	25 55 35.8	7.721
15	05 54 23.62	2.4893	28 39 52.8	0.678	15	07 56 03.76	2.5309	25 47 47.3	7.896
16	05 56 53.10	2.4933	28 40 28.4	0.508	16	07 58 35.55	2.5288	25 39 48.3	8.071
17	05 59 22.81	2.4969	28 40 53.7	0.336	17	08 01 07.22	2.5267	25 31 38.8	8.246
18	06 01 52.73	2.5005	28 41 08.7	+ 0.164	18	08 03 38.75	2.5243	25 23 18.8	8.419
19	06 04 22.87	2.5041	28 41 13.4	- 0.008	19	08 06 10.13	2.5219	25 14 48.5	8.592
20	06 06 53.22	2.5074	28 41 07.8	0.181	20	08 08 41.38	2.5195	25 06 07.8	8.764
21	06 09 23.76	2.5107	28 40 51.7	0.355	21	08 11 12.47	2.5168	24 57 16.8	8.936
22	06 11 54.50	2.5138	28 40 25.2	0.529	22	08 13 43.40	2.5142	24 48 15.5	9.107
23	06 14 25.42	2.5168	+28 39 48.2	- 0.705	23	08 16 14.17	2.5114	+24 39 04.0	- 9.277
Monday, September 7.					Wednesday, September 9.				
00	06 16 56.52	2.5198	+28 39 00.6	- 0.881	00	08 18 44.77	2.5086	+24 29 42.3	- 9.445
01	06 19 27.79	2.5225	28 38 02.5	1.057	01	08 21 15.20	2.5056	24 20 10.6	9.613
02	06 21 59.22	2.5252	28 36 53.8	1.234	02	08 23 45.44	2.5026	24 10 28.8	9.780
03	06 24 30.81	2.5277	28 35 34.4	1.412	03	08 26 15.51	2.4996	24 00 37.0	9.946
04	06 27 02.54	2.5300	28 34 04.4	1.590	04	08 28 45.39	2.4964	23 50 35.3	10.111
05	06 29 34.41	2.5323	28 32 23.6	1.768	05	08 31 15.08	2.4932	23 40 23.7	10.275
06	06 32 06.41	2.5343	28 30 32.2	1.947	06	08 33 44.57	2.4899	23 30 02.3	10.438
07	06 34 38.53	2.5363	28 28 30.0	2.127	07	08 36 13.87	2.4866	23 19 31.2	10.598
08	06 37 10.76	2.5381	28 26 17.0	2.306	08	08 38 42.96	2.4833	23 08 50.5	10.759
09	06 39 43.10	2.5398	28 23 53.3	2.486	09	08 41 11.86	2.4798	22 58 00.1	10.918
10	06 42 15.54	2.5415	28 21 18.7	2.667	10	08 43 40.54	2.4763	22 47 00.3	11.077
11	06 44 48.08	2.5429	28 18 33.3	2.848	11	08 46 09.01	2.4727	22 35 50.9	11.234
12	06 47 20.69	2.5442	28 15 37.0	3.028	12	08 48 37.26	2.4691	22 24 32.2	11.389
13	06 49 53.38	2.5454	28 12 29.9	3.210	13	08 51 05.30	2.4654	22 13 04.2	11.544
14	06 52 26.14	2.5464	28 09 11.8	3.392	14	08 53 33.11	2.4617	22 01 26.9	11.698
15	06 54 58.95	2.5473	28 05 42.9	3.573	15	08 56 00.70	2.4580	21 49 40.5	11.849
16	06 57 31.82	2.5481	28 02 03.1	3.755	16	08 58 28.07	2.4542	21 37 45.0	12.000
17	07 00 04.72	2.5487	27 58 12.3	3.937	17	09 00 55.20	2.4503	21 25 40.5	12.149
18	07 02 37.66	2.5493	27 54 10.7	4.118	18	09 03 22.11	2.4466	21 13 27.1	12.297
19	07 05 10.63	2.5496	27 49 58.2	4.300	19	09 05 48.79	2.4427	21 01 04.9	12.443
20	07 07 43.61	2.5498	27 45 34.7	4.483	20	09 08 15.23	2.4388	20 48 33.9	12.588
21	07 10 16.61	2.5500	27 41 00.3	4.664	21	09 10 41.44	2.4349	20 35 54.3	12.731
22	07 12 49.61	2.5499	27 36 15.0	4.846	22	09 13 07.42	2.4309	20 23 06.2	12.873
23	07 15 22.60	2.5498	27 31 18.8	5.028	23	09 15 33.15	2.4269	20 10 09.6	13.013
24	07 17 55.58	2.5495	+27 26 11.7	- 5.209	24	09 17 58.65	2.4230	+19 57 04.6	-13.153

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Thursday, September 10.					Saturday, September 12.				
00	h m s s		° ' "	—"	00	h m s s		° ' "	—"
00	09 17 58.65	2.4230	+19 57 04.6	—13.153	00	11 09 56.85	2.2571	+ 7 18 27.4	—17.729
01	09 20 23.91	2.4189	19 43 51.3	13.290	01	11 12 12.21	2.2549	7 00 42.2	17.776
02	09 22 48.92	2.4149	19 30 29.8	13.427	02	11 14 27.44	2.2528	6 42 54.3	17.821
03	09 25 13.70	2.4109	19 17 00.1	13.561	03	11 16 42.54	2.2507	6 25 03.7	17.864
04	09 27 38.23	2.4068	19 03 22.5	13.693	04	11 18 57.52	2.2487	6 07 10.6	17.904
05	09 30 02.52	2.4029	18 49 36.9	13.825	05	11 21 12.38	2.2468	5 49 15.2	17.943
06	09 32 26.58	2.3989	18 35 43.5	13.954	06	11 23 27.13	2.2450	5 31 17.5	17.980
07	09 34 50.39	2.3948	18 21 42.4	14.082	07	11 25 41.78	2.2433	5 13 17.6	18.014
08	09 37 13.96	2.3908	18 07 33.7	14.208	08	11 27 56.32	2.2415	4 55 15.8	18.047
09	09 39 37.29	2.3868	17 53 17.5	14.333	09	11 30 10.76	2.2399	4 37 12.0	18.077
10	09 42 00.38	2.3828	17 38 53.8	14.456	10	11 32 25.11	2.2384	4 19 06.6	18.105
11	09 44 23.22	2.3788	17 24 22.8	14.577	11	11 34 39.37	2.2369	4 00 59.4	18.132
12	09 46 45.83	2.3748	17 09 44.6	14.696	12	11 36 53.54	2.2355	3 42 50.8	18.155
13	09 49 08.20	2.3708	16 54 59.3	14.813	13	11 39 07.63	2.2343	3 24 40.8	18.178
14	09 51 30.33	2.3669	16 40 07.0	14.929	14	11 41 21.65	2.2331	3 06 29.5	18.198
15	09 53 52.23	2.3630	16 25 07.8	15.043	15	11 43 35.60	2.2319	2 48 17.1	18.214
16	09 56 13.89	2.3591	16 10 01.8	15.156	16	11 45 49.48	2.2308	2 30 03.8	18.229
17	09 58 35.32	2.3553	15 54 49.1	15.266	17	11 48 03.30	2.2299	2 11 49.6	18.243
18	10 00 56.52	2.3513	15 39 29.9	15.374	18	11 50 17.07	2.2290	1 53 34.6	18.255
19	10 03 17.48	2.3475	15 24 04.2	15.481	19	11 52 30.78	2.2282	1 35 19.0	18.264
20	10 05 38.22	2.3438	15 08 32.2	15.586	20	11 54 44.15	2.2274	1 17 02.9	18.272
21	10 07 58.74	2.3401	14 52 53.9	15.689	21	11 56 58.07	2.2268	0 58 46.4	18.277
22	10 10 19.03	2.3363	14 37 09.5	15.791	22	11 59 11.66	2.2263	0 40 29.7	18.279
23	10 12 39.09	2.3326	+14 21 19.0	—15.890	23	12 01 25.22	2.2258	+ 0 22 12.9	—18.280
Friday, September 11.					Sunday, September 13.				
00	h m s s		° ' "	—"	00	h m s s		° ' "	—"
00	10 14 58.94	2.3290	+14 05 22.7	—15.987	00	12 03 38.75	2.2253	+ 0 03 56.1	—18.279
01	10 17 18.57	2.3253	13 49 20.6	16.083	01	12 05 52.26	2.2250	— 0 14 20.6	18.276
02	10 19 37.98	2.3218	13 33 12.8	16.176	02	12 08 05.75	2.2248	0 32 37.0	18.270
03	10 21 57.19	2.3183	13 16 59.5	16.268	03	12 10 19.23	2.2246	0 50 53.0	18.263
04	10 24 16.18	2.3148	13 00 40.7	16.358	04	12 12 32.70	2.2245	1 09 08.5	18.253
05	10 26 34.96	2.3114	12 44 16.6	16.445	05	12 14 46.17	2.2245	1 27 23.4	18.242
06	10 28 53.55	2.3081	12 27 47.3	16.531	06	12 16 59.64	2.2246	1 45 37.5	18.228
07	10 31 11.93	2.3047	12 11 12.9	16.614	07	12 19 13.12	2.2248	2 03 50.7	18.212
08	10 33 30.11	2.3013	11 54 33.6	16.696	08	12 21 26.62	2.2251	2 22 02.9	18.194
09	10 35 48.09	2.2982	11 37 49.4	16.776	09	12 23 40.13	2.2253	2 40 14.0	18.175
10	10 38 05.89	2.2950	11 21 00.5	16.854	10	12 25 53.66	2.2258	2 58 23.9	18.153
11	10 40 23.49	2.2918	11 04 06.9	16.930	11	12 28 07.22	2.2263	3 16 32.3	18.128
12	10 42 40.91	2.2888	10 47 08.9	17.003	12	12 30 20.81	2.2268	3 34 39.3	18.102
13	10 44 58.15	2.2858	10 30 06.5	17.075	13	12 32 34.44	2.2275	3 52 44.6	18.074
14	10 47 15.21	2.2829	10 12 59.9	17.144	14	12 34 48.11	2.2282	4 10 48.2	18.045
15	10 49 32.10	2.2800	9 55 49.2	17.212	15	12 37 01.82	2.2290	4 28 50.0	18.013
16	10 51 48.81	2.2772	9 38 34.5	17.278	16	12 39 15.59	2.2299	4 46 49.7	17.978
17	10 54 05.36	2.2745	9 21 15.8	17.342	17	12 41 29.41	2.2308	5 04 47.4	17.942
18	10 56 21.75	2.2718	9 03 53.5	17.403	18	12 43 43.29	2.2319	5 22 42.8	17.904
19	10 58 37.97	2.2691	8 46 27.5	17.463	19	12 45 57.24	2.2331	5 40 35.9	17.864
20	11 00 54.04	2.2666	8 28 58.0	17.520	20	12 48 11.26	2.2343	5 58 26.5	17.822
21	11 03 09.96	2.2641	8 11 25.1	17.575	21	12 50 25.35	2.2355	6 16 14.5	17.778
22	11 05 25.73	2.2617	7 53 49.0	17.628	22	12 52 39.52	2.2368	6 33 59.8	17.732
23	11 07 41.36	2.2593	7 36 09.7	17.680	23	12 54 53.77	2.2383	6 51 42.3	17.683
24	11 09 56.85	2.2571	+ 7 18 27.4	—17.729	24	12 57 08.11	2.2398	— 7 09 21.8	—17.633

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Monday, September 14.					Wednesday, September 16.				
00	12 57 08.11	2.2398	- 7 09 21.8	-17.633	00	14 47 32.92	2.3782	-19 42 49.9	-13.101
01	12 59 22.54	2.2413	7 26 58.2	17.581	01	14 49 55.72	2.3818	19 55 52.0	12.968
02	13 01 37.07	2.2430	7 44 31.5	17.527	02	14 52 18.74	2.3855	20 08 46.0	12.832
03	13 03 51.70	2.2448	8 02 01.5	17.471	03	14 54 41.98	2.3891	20 21 31.8	12.695
04	13 06 06.44	2.2465	8 19 28.0	17.413	04	14 57 05.43	2.3928	20 34 09.4	12.558
05	13 08 21.28	2.2483	8 36 51.1	17.354	05	14 59 29.11	2.3964	20 46 38.7	12.418
06	13 10 36.24	2.2503	8 54 10.5	17.292	06	15 01 53.00	2.4000	20 58 59.6	12.278
07	13 12 51.32	2.2523	9 11 26.1	17.228	07	15 04 17.11	2.4036	21 11 12.0	12.136
08	13 15 06.52	2.2543	9 28 37.9	17.163	08	15 06 41.43	2.4071	21 23 15.9	11.993
09	13 17 21.84	2.2565	9 45 45.6	17.095	09	15 09 05.96	2.4107	21 35 11.1	11.848
10	13 19 37.30	2.2587	10 02 49.3	17.026	10	15 11 30.71	2.4143	21 46 57.7	11.703
11	13 21 52.88	2.2609	10 19 48.7	16.954	11	15 13 55.67	2.4178	21 58 35.5	11.557
12	13 24 08.61	2.2633	10 36 43.8	16.882	12	15 16 20.84	2.4213	22 10 04.5	11.409
13	13 26 24.48	2.2657	10 53 34.5	16.807	13	15 18 46.22	2.4248	22 21 24.6	11.259
14	13 28 40.49	2.2682	11 10 20.6	16.730	14	15 21 11.81	2.4282	22 32 35.6	11.108
15	13 30 56.66	2.2707	11 27 02.1	16.652	15	15 23 37.60	2.4315	22 43 37.6	10.958
16	13 33 12.97	2.2733	11 43 38.8	16.571	16	15 26 03.59	2.4349	22 54 30.5	10.805
17	13 35 29.45	2.2759	12 00 10.6	16.488	17	15 28 29.79	2.4383	23 05 14.2	10.652
18	13 37 46.08	2.2786	12 16 37.4	16.404	18	15 30 56.18	2.4415	23 15 48.7	10.498
19	13 40 02.88	2.2813	12 32 59.1	16.318	19	15 33 22.77	2.4448	23 26 13.9	10.342
20	13 42 19.84	2.2842	12 49 15.6	16.230	20	15 35 49.55	2.4479	23 36 29.7	10.185
21	13 44 36.98	2.2870	13 05 26.7	16.141	21	15 38 16.52	2.4511	23 46 36.1	10.028
22	13 46 54.28	2.2898	13 21 32.5	16.051	22	15 40 43.68	2.4543	23 56 33.0	9.869
23	13 49 11.76	2.2928	-13 37 32.8	-15.958	23	15 43 11.03	2.4573	-24 06 20.4	-9.710
Tuesday, September 15.					Thursday, September 17.				
00	13 51 29.42	2.2958	-13 53 27.4	-15.863	00	15 45 38.55	2.4602	-24 15 58.2	-9.550
01	13 53 47.26	2.2989	14 09 16.3	15.766	01	15 48 06.25	2.4632	24 25 26.4	9.388
02	13 56 05.29	2.3020	14 24 59.3	15.668	02	15 50 34.13	2.4660	24 34 44.8	9.226
03	13 58 23.50	2.3051	14 40 36.4	15.568	03	15 53 02.17	2.4688	24 43 53.5	9.063
04	14 00 41.90	2.3083	14 56 07.5	15.467	04	15 55 30.38	2.4716	24 52 52.3	8.899
05	14 03 00.50	2.3116	15 11 32.4	15.363	05	15 57 58.76	2.4743	25 01 41.4	8.735
06	14 05 19.29	2.3148	15 26 51.1	15.258	06	16 00 27.29	2.4768	25 10 20.5	8.569
07	14 07 38.27	2.3181	15 42 03.4	15.152	07	16 02 55.97	2.4793	25 18 49.7	8.403
08	14 09 57.46	2.3215	15 57 09.3	15.043	08	16 05 24.80	2.4817	25 27 08.8	8.236
09	14 12 16.85	2.3248	16 12 08.6	14.934	09	16 07 53.77	2.4841	25 35 18.0	8.069
10	14 14 36.44	2.3282	16 27 01.4	14.823	10	16 10 22.89	2.4864	25 43 17.1	7.901
11	14 16 56.23	2.3317	16 41 47.3	14.709	11	16 12 52.14	2.4886	25 51 06.1	7.732
12	14 19 16.24	2.3352	16 56 26.5	14.595	12	16 15 21.52	2.4908	25 58 44.9	7.562
13	14 21 36.45	2.3387	17 10 58.7	14.478	13	16 17 51.03	2.4928	26 06 13.5	7.392
14	14 23 56.88	2.3422	17 25 23.9	14.361	14	16 20 20.65	2.4947	26 13 31.9	7.222
15	14 26 17.51	2.3457	17 39 42.0	14.242	15	16 22 50.39	2.4965	26 20 40.1	7.051
16	14 28 38.36	2.3493	17 53 52.9	14.121	16	16 25 20.23	2.4983	26 27 38.0	6.878
17	14 30 59.42	2.3528	18 07 56.5	13.998	17	16 27 50.18	2.5000	26 34 25.5	6.706
18	14 33 20.70	2.3564	18 21 52.7	13.874	18	16 30 20.23	2.5015	26 41 02.7	6.534
19	14 35 42.19	2.3600	18 35 41.4	13.749	19	16 32 50.36	2.5029	26 47 29.6	6.361
20	14 38 03.90	2.3637	18 49 22.6	13.623	20	16 35 20.58	2.5043	26 53 46.0	6.188
21	14 40 25.83	2.3673	19 02 56.1	13.494	21	16 37 50.87	2.5055	26 59 52.1	6.013
22	14 42 47.97	2.3709	19 16 21.9	13.365	22	16 40 21.24	2.5068	27 05 47.6	5.839
23	14 45 10.34	2.3746	19 29 39.9	13.233	23	16 42 51.68	2.5078	27 11 32.8	5.665
24	14 47 32.92	2.3782	-19 42 49.9	-13.101	24	16 45 22.18	2.5088	-27 17 07.4	-5.490

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Friday, September 18.					Sunday, September 20.				
00	16 45 22.18	2.5088	-27 17 07.4	-5.490	00	18 44 39.14	2.4166	-28 20 28.1	+2.703
01	16 47 52.73	2.5096	27 22 31.6	5.315	01	18 47 04.00	2.4120	28 17 41.2	2.859
02	16 50 23.33	2.5103	27 27 45.2	5.140	02	18 49 28.58	2.4073	28 14 45.0	3.015
03	16 52 53.97	2.5109	27 32 48.4	4.965	03	18 51 52.88	2.4026	28 11 39.4	3.170
04	16 55 24.64	2.5113	27 37 41.0	4.788	04	18 54 16.89	2.3977	28 08 24.6	3.323
05	16 57 55.33	2.5118	27 42 23.0	4.613	05	18 56 40.60	2.3928	28 05 00.7	3.475
06	17 00 26.05	2.5121	27 46 54.5	4.438	06	18 59 04.02	2.3878	28 01 27.6	3.628
07	17 02 56.78	2.5122	27 51 15.5	4.262	07	19 01 27.13	2.3827	27 57 45.4	3.778
08	17 05 27.51	2.5123	27 55 25.9	4.085	08	19 03 49.94	2.3775	27 53 54.2	3.928
09	17 07 58.25	2.5122	27 59 25.7	3.909	09	19 06 12.43	2.3723	27 49 54.1	4.076
10	17 10 28.97	2.5119	28 03 15.0	3.733	10	19 08 34.61	2.3670	27 45 45.1	4.224
11	17 12 59.68	2.5117	28 06 53.7	3.557	11	19 10 56.47	2.3616	27 41 27.2	4.371
12	17 15 30.37	2.5113	28 10 21.8	3.381	12	19 13 18.00	2.3561	27 37 00.6	4.516
13	17 18 01.03	2.5107	28 13 39.4	3.204	13	19 15 39.20	2.3506	27 32 25.3	4.661
14	17 20 31.65	2.5100	28 16 46.3	3.028	14	19 18 00.07	2.3450	27 27 41.3	4.804
15	17 23 02.23	2.5092	28 19 42.8	2.853	15	19 20 20.60	2.3394	27 22 48.8	4.946
16	17 25 32.75	2.5082	28 22 28.7	2.678	16	19 22 40.80	2.3338	27 17 47.8	5.088
17	17 28 03.21	2.5072	28 25 04.1	2.503	17	19 25 00.66	2.3280	27 12 38.3	5.228
18	17 30 33.61	2.5061	28 27 29.0	2.328	18	19 27 20.16	2.3222	27 07 20.5	5.366
19	17 33 03.94	2.5048	28 29 43.4	2.153	19	19 29 39.32	2.3164	27 01 54.4	5.504
20	17 35 34.18	2.5033	28 31 47.3	1.978	20	19 31 58.13	2.3105	26 56 20.0	5.641
21	17 38 04.33	2.5018	28 33 40.7	1.803	21	19 34 16.58	2.3046	26 50 37.5	5.777
22	17 40 34.39	2.5002	28 35 23.6	1.628	22	19 36 34.68	2.2987	26 44 46.8	5.912
23	17 43 04.35	2.4983	-28 36 56.1	-1.455	23	19 38 52.42	2.2926	-26 38 48.1	+6.044
Saturday, September 19.					Monday, September 21.				
00	17 45 34.19	2.4964	-28 38 18.2	-1.282	00	19 41 09.79	2.2865	-26 32 41.5	+6.176
01	17 48 03.92	2.4944	28 39 29.9	1.109	01	19 43 26.80	2.2805	26 26 27.0	6.308
02	17 50 33.52	2.4923	28 40 31.3	0.937	02	19 45 43.45	2.2743	26 20 04.6	6.438
03	17 53 02.99	2.4900	28 41 22.3	0.764	03	19 47 59.72	2.2682	26 13 34.5	6.566
04	17 55 32.32	2.4876	28 42 03.0	0.593	04	19 50 15.63	2.2621	26 06 56.7	6.693
05	17 58 01.50	2.4851	28 42 33.5	0.423	05	19 52 31.17	2.2558	26 00 11.3	6.819
06	18 00 30.53	2.4825	28 42 53.7	0.252	06	19 54 46.33	2.2496	25 53 18.4	6.944
07	18 02 59.40	2.4798	28 43 03.7	-0.082	07	19 57 01.12	2.2434	25 46 18.0	7.068
08	18 05 28.10	2.4769	28 43 03.5	+0.088	08	19 59 15.54	2.2372	25 39 10.2	7.191
09	18 07 56.63	2.4740	28 42 53.2	0.257	09	20 01 29.58	2.2308	25 31 55.1	7.313
10	18 10 24.98	2.4709	28 42 32.7	0.425	10	20 03 43.24	2.2245	25 24 32.7	7.433
11	18 12 53.14	2.4677	28 42 02.2	0.593	11	20 05 56.52	2.2182	25 17 03.1	7.553
12	18 15 21.10	2.4643	28 41 21.6	0.760	12	20 08 09.42	2.2118	25 09 26.4	7.670
13	18 17 48.86	2.4610	28 40 31.0	0.926	13	20 10 21.94	2.2056	25 01 42.7	7.787
14	18 20 16.42	2.4574	28 39 30.5	1.091	14	20 12 34.09	2.1992	24 53 52.0	7.903
15	18 22 43.75	2.4538	28 38 20.1	1.256	15	20 14 45.85	2.1928	24 45 54.4	8.018
16	18 25 10.87	2.4501	28 36 59.8	1.420	16	20 16 57.23	2.1866	24 37 49.9	8.131
17	18 27 37.76	2.4463	28 35 29.7	1.583	17	20 19 08.24	2.1803	24 29 38.7	8.242
18	18 30 04.42	2.4423	28 33 49.8	1.746	18	20 21 18.86	2.1738	24 21 20.9	8.353
19	18 32 30.84	2.4383	28 32 00.2	1.908	19	20 23 29.10	2.1675	24 12 56.4	8.463
20	18 34 57.01	2.4342	28 30 00.9	2.068	20	20 25 38.96	2.1613	24 04 25.3	8.572
21	18 37 22.94	2.4299	28 27 52.0	2.228	21	20 27 48.45	2.1549	23 55 47.8	8.678
22	18 39 48.60	2.4256	28 25 33.5	2.387	22	20 29 57.55	2.1485	23 47 03.9	8.784
23	18 42 14.01	2.4212	28 23 05.6	2.545	23	20 32 06.27	2.1422	23 38 13.7	8.889
24	18 44 39.14	2.4166	-28 20 28.1	+2.703	24	20 34 14.61	2.1359	-23 29 17.2	+8.993

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Tuesday, September 22.					Thursday, September 24.				
00	20 34 14.61	2.1359	-23 29 17.2	+8.993	00	22 10 04.14	1.8734	-14 39 38.6	+12.663
01	20 36 22.58	2.1297	23 20 14.5	9.096	01	22 11 56.42	1.8692	14 26 57.2	12.715
02	20 38 30.17	2.1233	23 11 05.7	9.198	02	22 13 48.44	1.8649	14 14 12.8	12.765
03	20 40 37.38	2.1171	23 01 50.8	9.298	03	22 15 40.21	1.8608	14 01 25.4	12.814
04	20 42 44.22	2.1108	22 52 30.0	9.396	04	22 17 31.74	1.8568	13 48 35.1	12.863
05	20 44 50.68	2.1046	22 43 03.3	9.494	05	22 19 23.02	1.8528	13 35 41.8	12.911
06	20 46 56.77	2.0984	22 33 30.7	9.591	06	22 21 14.07	1.8488	13 22 45.8	12.957
07	20 49 02.49	2.0923	22 23 52.4	9.687	07	22 23 04.88	1.8449	13 09 47.0	13.003
08	20 51 07.84	2.0862	22 14 08.3	9.781	08	22 24 55.46	1.8411	12 56 45.4	13.048
09	20 53 12.83	2.0800	22 04 18.7	9.874	09	22 26 45.81	1.8373	12 43 41.2	13.092
10	20 55 17.44	2.0738	21 54 23.4	9.967	10	22 28 35.94	1.8337	12 30 34.4	13.135
11	20 57 21.69	2.0678	21 44 22.7	10.057	11	22 30 25.85	1.8300	12 17 25.0	13.178
12	20 59 25.58	2.0618	21 34 16.6	10.147	12	22 32 15.54	1.8264	12 04 13.1	13.218
13	21 01 29.11	2.0558	21 24 05.1	10.235	13	22 34 05.02	1.8230	11 50 58.8	13.259
14	21 03 32.27	2.0498	21 13 48.4	10.322	14	22 35 54.30	1.8196	11 37 42.0	13.299
15	21 05 35.08	2.0438	21 03 26.4	10.409	15	22 37 43.37	1.8162	11 24 22.9	13.337
16	21 07 37.53	2.0379	20 52 59.3	10.494	16	22 39 32.24	1.8128	11 11 01.6	13.374
17	21 09 39.63	2.0321	20 42 27.1	10.578	17	22 41 20.91	1.8096	10 57 38.0	13.412
18	21 11 41.38	2.0263	20 31 49.9	10.662	18	22 43 09.39	1.8064	10 44 12.1	13.448
19	21 13 42.79	2.0205	20 21 07.7	10.743	19	22 44 57.68	1.8033	10 30 44.2	13.483
20	21 15 43.84	2.0147	20 10 20.7	10.824	20	22 46 45.79	1.8003	10 17 14.2	13.518
21	21 17 44.55	2.0090	19 59 28.8	10.904	21	22 48 33.71	1.7973	10 03 42.1	13.552
22	21 19 44.92	2.0034	19 48 32.2	10.983	22	22 50 21.46	1.7944	9 50 08.0	13.583
23	21 21 44.96	1.9978	-19 37 30.8	+11.062	23	22 52 09.04	1.7915	-9 36 32.1	+13.615
Wednesday, September 23.					Friday, September 25.				
00	21 23 44.65	1.9921	-19 26 24.8	+11.138	00	22 53 56.44	1.7887	-9 22 54.2	+13.647
01	21 25 44.01	1.9867	19 15 14.3	11.213	01	22 55 43.68	1.7860	9 09 14.5	13.677
02	21 27 43.05	1.9812	19 03 59.3	11.287	02	22 57 30.76	1.7833	8 55 33.0	13.706
03	21 29 41.75	1.9757	18 52 39.9	11.360	03	22 59 17.68	1.7807	8 41 49.8	13.734
04	21 31 40.13	1.9703	18 41 16.1	11.433	04	23 01 04.44	1.7782	8 28 04.9	13.763
05	21 33 38.19	1.9649	18 29 48.0	11.504	05	23 02 51.06	1.7758	8 14 18.3	13.789
06	21 35 35.92	1.9597	18 18 15.6	11.574	06	23 04 37.53	1.7733	8 00 30.2	13.815
07	21 37 33.35	1.9544	18 06 39.1	11.643	07	23 06 23.86	1.7710	7 46 40.5	13.841
08	21 39 30.45	1.9492	17 54 58.5	11.711	08	23 08 10.05	1.7688	7 32 49.3	13.865
09	21 41 27.25	1.9441	17 43 13.8	11.778	09	23 09 56.11	1.7666	7 18 56.7	13.888
10	21 43 23.74	1.9390	17 31 25.1	11.844	10	23 11 42.04	1.7644	7 05 02.8	13.911
11	21 45 19.93	1.9339	17 19 32.5	11.908	11	23 13 27.84	1.7623	6 51 07.4	13.933
12	21 47 15.81	1.9289	17 07 36.1	11.973	12	23 15 13.52	1.7603	6 37 10.8	13.954
13	21 49 11.40	1.9240	16 55 35.8	12.036	13	23 16 59.08	1.7584	6 23 12.9	13.975
14	21 51 06.69	1.9191	16 43 31.8	12.098	14	23 18 44.53	1.7566	6 09 13.8	13.995
15	21 53 01.69	1.9143	16 31 24.1	12.158	15	23 20 29.87	1.7548	5 55 13.5	14.013
16	21 54 56.40	1.9095	16 19 12.8	12.218	16	23 22 15.10	1.7530	5 41 12.2	14.031
17	21 56 50.83	1.9048	16 06 57.9	12.278	17	23 24 00.23	1.7513	5 27 09.8	14.048
18	21 58 44.98	1.9001	15 54 39.5	12.336	18	23 25 45.26	1.7498	5 13 06.4	14.065
19	22 00 38.84	1.8955	15 42 17.6	12.393	19	23 27 30.20	1.7483	4 59 02.0	14.081
20	22 02 32.44	1.8910	15 29 52.4	12.448	20	23 29 15.05	1.7468	4 44 56.7	14.096
21	22 04 25.76	1.8865	15 17 23.8	12.504	21	23 30 59.81	1.7453	4 30 50.5	14.110
22	22 06 18.82	1.8821	15 04 51.9	12.558	22	23 32 44.49	1.7440	4 16 43.5	14.123
23	22 08 11.61	1.8777	14 52 16.8	12.611	23	23 34 29.09	1.7428	4 02 35.7	14.136
24	22 10 04.14	1.8734	-14 39 38.6	+12.663	24	23 36 13.62	1.7416	-3 48 27.2	+14.148

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Saturday, September 26.					Monday, September 28.				
00	^h 23 ^m 36 ^s 13.62	1.7416	— 3 48 27.2	+14.148	00	^h 00 ^m 59 ^s 42.29	1.7622	+ 7 29 51.8	+13.823
01	23 37 58.08	1.7404	3 34 18.0	14.159	01	01 01 28.08	1.7642	7 43 40.4	13.798
02	23 39 42.47	1.7393	3 20 08.1	14.169	02	01 03 13.99	1.7663	7 57 27.5	13.772
03	23 41 26.80	1.7383	3 05 57.7	14.178	03	01 05 00.03	1.7685	8 11 13.0	13.744
04	23 43 11.07	1.7374	2 51 46.7	14.188	04	01 06 46.21	1.7708	8 24 56.8	13.717
05	23 44 55.29	1.7366	2 37 35.2	14.196	05	01 08 32.52	1.7730	8 38 39.0	13.688
06	23 46 39.46	1.7358	2 23 23.2	14.203	06	01 10 18.97	1.7753	8 52 19.4	13.658
07	23 48 23.58	1.7350	2 09 10.9	14.209	07	01 12 05.56	1.7778	9 05 58.0	13.628
08	23 50 07.66	1.7344	1 54 58.1	14.215	08	01 13 52.30	1.7803	9 19 34.7	13.597
09	23 51 51.71	1.7338	1 40 45.1	14.220	09	01 15 39.20	1.7828	9 33 09.6	13.566
10	23 53 35.72	1.7333	1 26 31.7	14.225	10	01 17 26.24	1.7854	9 46 42.6	13.533
11	23 55 19.70	1.7328	1 12 18.1	14.228	11	01 19 13.45	1.7882	10 00 13.5	13.499
12	23 57 03.65	1.7323	0 58 04.4	14.230	12	01 21 00.82	1.7909	10 13 42.5	13.465
13	23 58 47.58	1.7321	0 43 50.5	14.233	13	01 22 48.36	1.7938	10 27 09.3	13.429
14	00 00 31.50	1.7318	0 29 36.5	14.233	14	01 24 36.07	1.7966	10 40 34.0	13.393
15	00 02 15.40	1.7316	0 15 22.5	14.234	15	01 26 23.95	1.7995	10 53 56.4	13.356
16	00 03 59.29	1.7314	— 0 01 08.4	14.234	16	01 28 12.01	1.8025	11 07 16.7	13.318
17	00 05 43.17	1.7313	+ 0 13 05.6	14.233	17	01 30 00.25	1.8056	11 20 34.6	13.279
18	00 07 27.05	1.7313	0 27 19.5	14.231	18	01 31 48.68	1.8088	11 33 50.2	13.241
19	00 09 10.93	1.7314	0 41 33.3	14.228	19	01 33 37.30	1.8119	11 47 03.5	13.201
20	00 10 54.82	1.7316	0 55 46.9	14.225	20	01 35 26.11	1.8151	12 00 14.3	13.159
21	00 12 38.72	1.7318	1 10 00.3	14.222	21	01 37 15.11	1.8184	12 13 22.6	13.117
22	00 14 22.63	1.7321	1 24 13.5	14.217	22	01 39 04.32	1.8218	12 26 28.3	13.074
23	00 16 06.57	1.7324	+ 1 38 26.3	+14.210	23	01 40 53.73	1.8253	+12 39 31.5	+13.031
Sunday, September 27.					Tuesday, September 29.				
00	00 17 50.52	1.7328	+ 1 52 38.7	+14.204	00	01 42 43.35	1.8288	+12 52 32.0	+12.986
01	00 19 34.50	1.7333	2 06 50.8	14.198	01	01 44 33.18	1.8323	13 05 29.8	12.941
02	00 21 18.51	1.7338	2 21 02.4	14.189	02	01 46 23.22	1.8359	13 18 24.9	12.894
03	00 23 02.56	1.7344	2 35 13.5	14.180	03	01 48 13.49	1.8397	13 31 17.1	12.848
04	00 24 46.64	1.7351	2 49 24.0	14.171	04	01 50 03.98	1.8433	13 44 06.6	12.800
05	00 26 30.77	1.7358	3 03 34.0	14.162	05	01 51 54.69	1.8471	13 56 53.1	12.751
06	00 28 14.94	1.7366	3 17 43.4	14.151	06	01 53 45.63	1.8509	14 09 36.7	12.701
07	00 29 59.16	1.7374	3 31 52.1	14.138	07	01 55 36.80	1.8548	14 22 17.2	12.650
08	00 31 43.43	1.7383	3 46 00.0	14.126	08	01 57 28.21	1.8588	14 34 54.7	12.598
09	00 33 27.76	1.7393	4 00 07.2	14.113	09	01 59 19.86	1.8629	14 47 29.0	12.546
10	00 35 12.15	1.7403	4 14 13.6	14.099	10	02 01 11.76	1.8670	15 00 00.2	12.493
11	00 36 56.60	1.7414	4 28 19.1	14.084	11	02 03 03.90	1.8711	15 12 28.2	12.438
12	00 38 41.12	1.7427	4 42 23.7	14.069	12	02 04 56.29	1.8753	15 24 52.8	12.383
13	00 40 25.72	1.7440	4 56 27.4	14.053	13	02 06 48.94	1.8796	15 37 14.1	12.327
14	00 42 10.40	1.7453	5 10 30.0	14.036	14	02 08 41.84	1.8838	15 49 32.0	12.270
15	00 43 55.15	1.7467	5 24 31.7	14.018	15	02 10 35.00	1.8882	16 01 46.5	12.213
16	00 45 40.00	1.7482	5 38 32.2	13.999	16	02 12 28.43	1.8927	16 13 57.5	12.153
17	00 47 24.93	1.7496	5 52 31.6	13.980	17	02 14 22.12	1.8971	16 26 04.9	12.093
18	00 49 09.95	1.7512	6 06 29.8	13.960	18	02 16 16.08	1.9016	16 38 08.6	12.032
19	00 50 55.08	1.7529	6 20 26.8	13.939	19	02 18 10.31	1.9062	16 50 08.7	11.971
20	00 52 40.30	1.7546	6 34 22.5	13.918	20	02 20 04.82	1.9108	17 02 05.1	11.908
21	00 54 25.63	1.7564	6 48 17.0	13.896	21	02 21 59.61	1.9156	17 13 57.7	11.844
22	00 56 11.07	1.7583	7 02 10.0	13.872	22	02 23 54.69	1.9203	17 25 46.4	11.779
23	00 57 56.62	1.7602	7 16 01.6	13.848	23	02 25 50.04	1.9250	17 37 31.2	11.713
24	00 59 42.29	1.7622	+ 7 29 51.8	+13.823	24	02 27 45.69	1.9299	+17 49 12.0	+11.647

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Wednesday, September 30.					Friday, October 2.				
00	h m s	s	° ' "	"	00	h m s	s	° ' "	"
00	02 27 45.69	1.9299	+17 49 12.0	+11.647	00	04 06 41.39	2.2012	+25 32 00.3	+7.223
01	02 29 41.63	1.9348	18 00 48.8	11.579	01	04 08 53.64	2.2072	25 39 10.2	7.105
02	02 31 37.86	1.9396	18 12 21.5	11.511	02	04 11 06.25	2.2131	25 46 12.9	6.984
03	02 33 34.38	1.9446	18 23 50.1	11.442	03	04 13 19.21	2.2189	25 53 08.3	6.863
04	02 35 31.21	1.9498	18 35 14.5	11.372	04	04 15 32.52	2.2248	25 59 56.5	6.742
05	02 37 28.35	1.9548	18 46 34.7	11.300	05	04 17 46.19	2.2308	26 06 37.3	6.618
06	02 39 25.79	1.9598	18 57 50.5	11.227	06	04 20 00.21	2.2366	26 13 10.7	6.494
07	02 41 23.53	1.9650	19 09 01.9	11.153	07	04 22 14.58	2.2423	26 19 36.6	6.368
08	02 43 21.59	1.9703	19 20 08.9	11.079	08	04 24 29.29	2.2481	26 25 54.9	6.242
09	02 45 19.96	1.9755	19 31 11.4	11.003	09	04 26 44.35	2.2538	26 32 05.6	6.114
10	02 47 18.65	1.9808	19 42 09.3	10.927	10	04 28 59.75	2.2596	26 38 08.6	5.985
11	02 49 17.65	1.9861	19 53 02.6	10.849	11	04 31 15.50	2.2653	26 44 03.8	5.855
12	02 51 16.98	1.9915	20 03 51.2	10.770	12	04 33 31.58	2.2708	26 49 51.2	5.724
13	02 53 16.63	1.9969	20 14 35.0	10.690	13	04 35 48.00	2.2765	26 55 30.7	5.593
14	02 55 16.61	2.0023	20 25 14.0	10.610	14	04 38 04.76	2.2821	27 01 02.3	5.460
15	02 57 16.91	2.0078	20 35 48.2	10.528	15	04 40 21.85	2.2876	27 06 25.9	5.326
16	02 59 17.55	2.0134	20 46 17.4	10.445	16	04 42 39.27	2.2930	27 11 41.4	5.190
17	03 01 18.52	2.0189	20 56 41.6	10.362	17	04 44 57.01	2.2984	27 16 48.7	5.053
18	03 03 19.82	2.0244	21 07 00.8	10.278	18	04 47 15.08	2.3038	27 21 47.8	4.917
19	03 05 21.45	2.0301	21 17 14.9	10.192	19	04 49 33.47	2.3092	27 26 38.7	4.779
20	03 07 23.43	2.0358	21 27 23.8	10.104	20	04 51 52.18	2.3144	27 31 21.3	4.640
21	03 09 25.74	2.0414	21 37 27.4	10.016	21	04 54 11.20	2.3196	27 35 55.5	4.499
22	03 11 28.40	2.0472	21 47 25.7	9.927	22	04 56 30.53	2.3248	27 40 21.2	4.358
23	03 13 31.40	2.0529	+21 57 18.6	+9.836	23	04 58 50.17	2.3298	+27 44 38.4	+4.216
Thursday, October 1.					Saturday, October 3.				
00	03 15 34.75	2.0587	+22 07 06.0	+9.745	00	05 01 10.11	2.3348	+27 48 47.1	+4.073
01	03 17 38.44	2.0644	22 16 48.0	9.653	01	05 03 30.35	2.3398	27 52 47.2	3.929
02	03 19 42.48	2.0703	22 26 24.3	9.559	02	05 05 50.89	2.3448	27 56 38.6	3.783
03	03 21 46.88	2.0762	22 35 55.1	9.465	03	05 08 11.72	2.3496	28 00 21.2	3.638
04	03 23 51.62	2.0820	22 45 20.1	9.369	04	05 10 32.84	2.3544	28 03 55.1	3.491
05	03 25 56.72	2.0879	22 54 39.4	9.273	05	05 12 54.25	2.3591	28 07 20.1	3.343
06	03 28 02.17	2.0938	23 03 52.8	9.174	06	05 15 15.93	2.3636	28 10 36.2	3.194
07	03 30 07.97	2.0997	23 13 00.3	9.076	07	05 17 37.88	2.3682	28 13 43.4	3.045
08	03 32 14.13	2.1056	23 22 01.9	8.976	08	05 20 00.11	2.3727	28 16 41.6	2.894
09	03 34 20.64	2.1115	23 30 57.4	8.874	09	05 22 22.60	2.3770	28 19 30.7	2.743
10	03 36 27.51	2.1175	23 39 46.8	8.772	10	05 24 45.35	2.3813	28 22 10.7	2.590
11	03 38 34.74	2.1235	23 48 30.0	8.668	11	05 27 08.35	2.3855	28 24 41.5	2.438
12	03 40 42.33	2.1294	23 57 07.0	8.564	12	05 29 31.61	2.3897	28 27 03.2	2.284
13	03 42 50.27	2.1354	24 05 37.7	8.458	13	05 31 55.11	2.3937	28 29 15.6	2.129
14	03 44 58.58	2.1414	24 14 02.0	8.352	14	05 34 18.85	2.3977	28 31 18.7	1.973
15	03 47 07.24	2.1474	24 22 19.9	8.244	15	05 36 42.83	2.4015	28 33 12.4	1.817
16	03 49 16.27	2.1534	24 30 31.3	8.135	16	05 39 07.03	2.4053	28 34 56.7	1.660
17	03 51 25.65	2.1594	24 38 36.1	8.025	17	05 41 31.46	2.4089	28 36 31.6	1.503
18	03 53 35.40	2.1654	24 46 34.3	7.914	18	05 43 56.10	2.4125	28 37 57.0	1.343
19	03 55 45.50	2.1713	24 54 25.8	7.802	19	05 46 20.96	2.4160	28 39 12.8	1.184
20	03 57 55.96	2.1773	25 02 10.5	7.688	20	05 48 46.02	2.4193	28 40 19.1	1.025
21	04 00 06.78	2.1833	25 09 48.4	7.574	21	05 51 11.28	2.4227	28 41 15.8	0.864
22	04 02 17.96	2.1893	25 17 19.4	7.458	22	05 53 36.74	2.4258	28 42 02.8	0.703
23	04 04 29.50	2.1953	25 24 43.4	7.341	23	05 56 02.38	2.4289	28 42 40.1	0.541
24	04 06 41.39	2.2012	+25 32 00.3	+7.223	24	05 58 28.21	2.4320	+28 43 07.7	+0.378

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Sunday, October 4.					Tuesday, October 6.				
00	05 58 28.21	2.4320	+28 43 07.7	+0.378	00	07 56 34.24	2.4483	+25 47 58.8	-7.688
01	06 00 54.22	2.4348	28 43 25.5	0.216	01	07 59 01.08	2.4463	25 40 12.6	7.852
02	06 03 20.39	2.4376	28 43 33.6	+0.052	02	08 01 27.80	2.4443	25 32 16.6	8.015
03	06 05 46.73	2.4403	28 43 31.8	-0.113	03	08 03 54.39	2.4421	25 24 10.8	8.178
04	06 08 13.22	2.4428	28 43 20.1	0.277	04	08 06 20.85	2.4398	25 15 55.2	8.340
05	06 10 39.86	2.4453	28 42 58.6	0.442	05	08 08 47.17	2.4374	25 07 30.0	8.501
06	06 13 06.65	2.4477	28 42 27.1	0.608	06	08 11 13.34	2.4350	24 58 55.1	8.662
07	06 15 33.58	2.4498	28 41 45.7	0.773	07	08 13 39.37	2.4327	24 50 10.6	8.822
08	06 18 00.63	2.4519	28 40 54.3	0.941	08	08 16 05.26	2.4302	24 41 16.5	8.980
09	06 20 27.81	2.4540	28 39 52.8	1.108	09	08 18 30.99	2.4275	24 32 13.0	9.138
10	06 22 55.11	2.4559	28 38 41.4	1.274	10	08 20 56.56	2.4249	24 22 59.9	9.297
11	06 25 22.52	2.4577	28 37 19.9	1.442	11	08 23 21.98	2.4223	24 13 37.3	9.454
12	06 27 50.03	2.4593	28 35 48.4	1.610	12	08 25 47.23	2.4195	24 04 05.4	9.609
13	06 30 17.64	2.4609	28 34 06.7	1.779	13	08 28 12.32	2.4167	23 54 24.2	9.765
14	06 32 45.34	2.4623	28 32 14.9	1.948	14	08 30 37.24	2.4138	23 44 33.6	9.920
15	06 35 13.12	2.4637	28 30 13.0	2.116	15	08 33 01.98	2.4110	23 34 33.8	10.073
16	06 37 40.98	2.4649	28 28 01.0	2.286	16	08 35 26.56	2.4081	23 24 24.8	10.226
17	06 40 08.91	2.4661	28 25 38.7	2.456	17	08 37 50.95	2.4051	23 14 06.7	10.378
18	06 42 36.91	2.4671	28 23 06.3	2.624	18	08 40 15.17	2.4022	23 03 39.5	10.528
19	06 45 04.96	2.4679	28 20 23.8	2.794	19	08 42 39.21	2.3991	22 53 03.3	10.678
20	06 47 33.06	2.4687	28 17 31.0	2.965	20	08 45 03.06	2.3960	22 42 18.1	10.827
21	06 50 01.20	2.4693	28 14 28.0	3.134	21	08 47 26.73	2.3930	22 31 24.1	10.975
22	06 52 29.38	2.4700	28 11 14.9	3.304	22	08 49 50.22	2.3898	22 20 21.1	11.122
23	06 54 57.60	2.4704	+28 07 51.5	-3.476	23	08 52 13.51	2.3867	+22 09 09.4	-11.268
Monday, October 5.					Wednesday, October 7.				
00	06 57 25.83	2.4707	+28 04 17.8	-3.647	00	08 54 36.62	2.3836	+21 57 49.0	-11.413
01	06 59 54.08	2.4710	28 00 33.9	3.817	01	08 56 59.54	2.3803	21 46 19.9	11.556
02	07 02 22.35	2.4711	27 56 39.8	3.987	02	08 59 22.26	2.3771	21 34 42.3	11.698
03	07 04 50.61	2.4711	27 52 35.5	4.158	03	09 01 44.79	2.3739	21 22 56.1	11.841
04	07 07 18.88	2.4710	27 48 20.9	4.328	04	09 04 07.13	2.3707	21 11 01.4	11.981
05	07 09 47.13	2.4708	27 43 56.2	4.498	05	09 06 29.27	2.3674	20 58 58.4	12.120
06	07 12 15.37	2.4704	27 39 21.2	4.668	06	09 08 51.22	2.3642	20 46 47.0	12.258
07	07 14 43.58	2.4700	27 34 36.0	4.838	07	09 11 12.97	2.3609	20 34 27.4	12.395
08	07 17 11.77	2.4696	27 29 40.6	5.008	08	09 13 34.53	2.3577	20 21 59.6	12.531
09	07 19 39.93	2.4689	27 24 35.0	5.178	09	09 15 55.89	2.3543	20 09 23.7	12.666
10	07 22 08.04	2.4682	27 19 19.3	5.348	10	09 18 17.05	2.3511	19 56 39.7	12.799
11	07 24 36.11	2.4674	27 13 53.3	5.518	11	09 20 38.02	2.3478	19 43 47.8	12.931
12	07 27 04.13	2.4665	27 08 17.2	5.686	12	09 22 58.79	2.3446	19 30 48.0	13.062
13	07 29 32.09	2.4655	27 02 31.0	5.855	13	09 25 19.37	2.3413	19 17 40.4	13.192
14	07 31 59.99	2.4643	26 56 34.6	6.023	14	09 27 39.75	2.3381	19 04 25.0	13.320
15	07 34 27.81	2.4631	26 50 28.2	6.192	15	09 29 59.94	2.3348	18 51 02.0	13.446
16	07 36 55.56	2.4618	26 44 11.6	6.361	16	09 32 19.92	2.3315	18 37 31.5	13.572
17	07 39 23.23	2.4605	26 37 44.9	6.528	17	09 34 39.72	2.3283	18 23 53.4	13.697
18	07 41 50.82	2.4590	26 31 08.2	6.695	18	09 36 59.32	2.3251	18 10 07.9	13.819
19	07 44 18.31	2.4574	26 24 21.5	6.862	19	09 39 18.73	2.3219	17 56 15.1	13.941
20	07 46 45.71	2.4558	26 17 24.8	7.028	20	09 41 37.95	2.3188	17 42 15.0	14.061
21	07 49 13.01	2.4541	26 10 18.2	7.193	21	09 43 56.98	2.3156	17 28 07.8	14.180
22	07 51 40.20	2.4523	26 03 01.7	7.358	22	09 46 15.82	2.3125	17 13 53.4	14.298
23	07 54 07.28	2.4503	25 55 35.2	7.524	23	09 48 34.48	2.3093	16 59 32.1	14.413
24	07 56 34.24	2.4483	+25 47 58.8	-7.688	24	09 50 52.94	2.3063	+16 45 03.8	-14.528

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Thursday, October 8.					Saturday, October 10.				
00	h m s	s	° ' "	"	00	h m s	s	° ' "	"
01	09 50 52.94	2.3063	+16 45 03.8	-14.528	01	11 38 56.85	2.2203	+ 3 26 26.4	-18.073
02	09 53 11.23	2.3033	16 30 28.7	14.641	02	11 41 10.06	2.2203	3 08 21.1	18.102
03	09 55 29.34	2.3003	16 15 46.9	14.753	03	11 43 23.28	2.2203	2 50 14.2	18.128
04	09 57 47.26	2.2973	16 00 58.4	14.863	04	11 45 36.49	2.2203	2 32 05.7	18.153
05	10 00 05.01	2.2944	15 46 03.4	14.971	05	11 47 49.71	2.2204	2 13 55.9	18.175
06	10 02 22.59	2.2915	15 31 01.9	15.078	06	11 50 02.94	2.2207	1 55 44.7	18.197
07	10 04 39.99	2.2886	15 15 54.0	15.183	07	11 52 16.19	2.2210	1 37 32.3	18.215
08	10 06 57.22	2.2858	15 00 39.9	15.288	08	11 54 29.46	2.2214	1 19 18.9	18.231
09	10 09 14.28	2.2830	14 45 19.5	15.390	09	11 56 42.76	2.2219	1 01 04.6	18.245
10	10 11 31.18	2.2803	14 29 53.1	15.491	10	11 58 56.09	2.2225	0 42 49.5	18.258
11	10 13 47.91	2.2776	14 14 20.6	15.590	11	12 01 09.46	2.2232	0 24 33.7	18.268
12	10 16 04.49	2.2749	13 58 42.3	15.688	12	12 03 22.87	2.2238	+ 0 06 17.3	18.277
13	10 18 20.90	2.2723	13 42 58.1	15.784	13	12 05 36.32	2.2247	- 0 11 59.5	18.283
14	10 20 37.16	2.2698	13 27 08.2	15.878	14	12 07 49.83	2.2256	0 30 16.6	18.287
15	10 22 53.27	2.2673	13 11 12.7	15.971	15	12 10 03.39	2.2265	0 48 33.9	18.288
16	10 25 09.23	2.2648	12 55 11.7	16.062	16	12 12 17.01	2.2277	1 06 51.2	18.288
17	10 27 25.05	2.2624	12 39 05.3	16.152	17	12 14 30.71	2.2288	1 25 08.5	18.287
18	10 29 40.72	2.2600	12 22 53.5	16.240	18	12 16 44.47	2.2300	1 43 25.6	18.283
19	10 31 56.25	2.2578	12 06 36.5	16.326	19	12 18 58.31	2.2313	2 01 42.4	18.276
20	10 34 11.65	2.2556	11 50 14.4	16.410	20	12 21 12.22	2.2327	2 19 58.7	18.268
21	10 36 26.92	2.2534	11 33 47.3	16.493	21	12 23 26.23	2.2342	2 38 14.5	18.257
22	10 38 42.06	2.2513	11 17 15.3	16.574	22	12 25 40.32	2.2357	2 56 29.5	18.244
23	10 40 57.07	2.2492	11 00 38.4	16.653	23	12 27 54.51	2.2373	3 14 43.8	18.229
24	10 43 11.96	2.2473	+10 43 56.9	-16.731	24	12 30 08.80	2.2391	- 3 32 57.0	-18.212
Friday, October 9.					Sunday, October 11.				
00	10 45 26.74	2.2453	+10 27 10.7	-16.807	00	12 32 23.20	2.2409	- 3 51 09.2	-18.193
01	10 47 41.40	2.2434	10 10 20.1	16.881	01	12 34 37.71	2.2428	4 09 20.2	18.172
02	10 49 55.95	2.2417	9 53 25.0	16.953	02	12 36 52.33	2.2447	4 27 29.8	18.148
03	10 52 10.40	2.2399	9 36 25.7	17.023	03	12 39 07.07	2.2468	4 45 37.9	18.123
04	10 54 24.74	2.2383	9 19 22.2	17.093	04	12 41 21.94	2.2488	5 03 44.5	18.095
05	10 56 38.99	2.2368	9 02 14.6	17.159	05	12 43 36.93	2.2510	5 21 49.3	18.064
06	10 58 53.15	2.2352	8 45 03.1	17.224	06	12 45 52.06	2.2533	5 39 52.2	18.033
07	11 01 07.21	2.2337	8 27 47.7	17.288	07	12 48 07.32	2.2556	5 57 53.2	17.999
08	11 03 21.19	2.2323	8 10 28.6	17.348	08	12 50 22.73	2.2581	6 15 52.1	17.963
09	11 05 35.09	2.2310	7 53 05.9	17.408	09	12 52 38.29	2.2606	6 33 48.7	17.924
10	11 07 48.91	2.2298	7 35 39.6	17.466	10	12 54 54.00	2.2631	6 51 43.0	17.883
11	11 10 02.66	2.2286	7 18 10.0	17.522	11	12 57 09.86	2.2658	7 09 34.7	17.841
12	11 12 16.34	2.2275	7 00 37.0	17.576	12	12 59 25.89	2.2685	7 27 23.9	17.797
13	11 14 29.96	2.2264	6 43 00.9	17.628	13	13 01 42.08	2.2713	7 45 10.3	17.749
14	11 16 43.51	2.2255	6 25 21.6	17.678	14	13 03 58.44	2.2742	8 02 53.8	17.700
15	11 18 57.02	2.2247	6 07 39.5	17.726	15	13 06 14.98	2.2771	8 20 34.3	17.648
16	11 21 10.47	2.2238	5 49 54.5	17.773	16	13 08 31.69	2.2800	8 38 11.6	17.595
17	11 23 23.88	2.2231	5 32 06.8	17.817	17	13 10 48.58	2.2832	8 55 45.7	17.540
18	11 25 37.24	2.2224	5 14 16.5	17.859	18	13 13 05.67	2.2863	9 13 16.4	17.482
19	11 27 50.57	2.2219	4 56 23.7	17.900	19	13 15 22.94	2.2894	9 30 43.5	17.422
20	11 30 03.87	2.2215	4 38 28.5	17.939	20	13 17 40.40	2.2928	9 48 07.0	17.360
21	11 32 17.15	2.2211	4 20 31.0	17.975	21	13 19 58.07	2.2961	10 05 26.7	17.295
22	11 34 30.40	2.2207	4 02 31.5	18.009	22	13 22 15.93	2.2995	10 22 42.4	17.228
23	11 36 43.63	2.2204	3 44 29.9	18.043	23	13 24 34.01	2.3030	10 39 54.1	17.161
24	11 38 56.85	2.2203	+ 3 26 26.4	-18.072	24	13 26 52.29	2.3064	-10 57 01.7	-17.091

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Monday, October 12.					Wednesday, October 14.				
00	13 26 52.29	2.3064	10 57 01.7	17.091	00	15 22 21.47	2.5095	22 37 42.4	11.392
01	13 29 10.78	2.3100	11 14 05.0	17.018	01	15 24 52.16	2.5135	22 49 01.1	11.231
02	13 31 29.49	2.3137	11 31 03.8	16.943	02	15 27 23.09	2.5175	23 00 10.1	11.069
03	13 33 48.42	2.3174	11 47 58.1	16.866	03	15 29 54.26	2.5213	23 11 09.4	10.906
04	13 36 07.58	2.3212	12 04 47.7	16.787	04	15 32 25.65	2.5251	23 21 58.8	10.741
05	13 38 26.96	2.3249	12 21 32.5	16.705	05	15 34 57.27	2.5288	23 32 38.3	10.576
06	13 40 46.57	2.3288	12 38 12.3	16.622	06	15 37 29.10	2.5323	23 43 07.9	10.409
07	13 43 06.41	2.3327	12 54 47.1	16.538	07	15 40 01.15	2.5359	23 53 27.4	10.240
08	13 45 26.49	2.3367	13 11 16.8	16.450	08	15 42 33.41	2.5394	24 03 36.7	10.071
09	13 47 46.81	2.3406	13 27 41.1	16.360	09	15 45 05.88	2.5428	24 13 35.9	9.901
10	13 50 07.36	2.3446	13 44 00.0	16.268	10	15 47 38.55	2.5462	24 23 24.8	9.729
11	13 52 28.16	2.3488	14 00 13.3	16.175	11	15 50 11.42	2.5494	24 33 03.4	9.557
12	13 54 49.21	2.3528	14 16 21.0	16.080	12	15 52 44.48	2.5526	24 42 31.6	9.383
13	13 57 10.50	2.3570	14 32 22.9	15.983	13	15 55 17.73	2.5557	24 51 49.4	9.208
14	13 59 32.05	2.3613	14 48 18.9	15.883	14	15 57 51.16	2.5586	25 00 56.6	9.032
15	14 01 53.85	2.3655	15 04 08.8	15.780	15	16 00 24.76	2.5614	25 09 53.2	8.856
16	14 04 15.91	2.3698	15 19 52.5	15.677	16	16 02 58.53	2.5643	25 18 39.3	8.678
17	14 06 38.22	2.3741	15 35 30.0	15.572	17	16 05 32.47	2.5669	25 27 14.6	8.500
18	14 09 00.80	2.3784	15 51 01.1	15.463	18	16 08 06.56	2.5694	25 35 39.3	8.321
19	14 11 23.63	2.3827	16 06 25.6	15.353	19	16 10 40.80	2.5719	25 43 53.1	8.141
20	14 13 46.72	2.3871	16 21 43.5	15.243	20	16 13 15.19	2.5743	25 51 56.2	7.961
21	14 16 10.08	2.3915	16 36 54.7	15.129	21	16 15 49.71	2.5765	25 59 48.4	7.778
22	14 18 33.70	2.3959	16 51 59.0	15.013	22	16 18 24.37	2.5786	26 07 29.6	7.596
23	14 20 57.59	2.4003	17 06 56.3	14.896	23	16 20 59.14	2.5806	26 14 59.9	7.413
Tuesday, October 13.					Thursday, October 15.				
00	14 23 21.74	2.4048	17 21 46.5	14.777	00	16 23 34.04	2.5826	26 22 19.2	7.230
01	14 25 46.16	2.4093	17 36 29.5	14.656	01	16 26 09.05	2.5843	26 29 27.5	7.046
02	14 28 10.85	2.4138	17 51 05.2	14.533	02	16 28 44.16	2.5859	26 36 24.7	6.861
03	14 30 35.81	2.4183	18 05 33.4	14.408	03	16 31 19.36	2.5874	26 43 10.8	6.676
04	14 33 01.05	2.4228	18 19 54.1	14.282	04	16 33 54.65	2.5888	26 49 45.8	6.491
05	14 35 26.55	2.4273	18 34 07.2	14.153	05	16 36 30.02	2.5900	26 56 09.7	6.304
06	14 37 52.32	2.4318	18 48 12.4	14.022	06	16 39 05.45	2.5912	27 02 22.3	6.118
07	14 40 18.36	2.4363	19 02 09.8	13.890	07	16 41 40.96	2.5922	27 08 23.8	5.932
08	14 42 44.67	2.4408	19 15 59.2	13.757	08	16 44 16.51	2.5929	27 14 14.1	5.744
09	14 45 11.25	2.4453	19 29 40.6	13.621	09	16 46 52.11	2.5937	27 19 53.1	5.557
10	14 47 38.10	2.4498	19 43 13.7	13.483	10	16 49 27.76	2.5943	27 25 20.9	5.369
11	14 50 05.22	2.4542	19 56 38.6	13.344	11	16 52 03.43	2.5948	27 30 37.4	5.181
12	14 52 32.60	2.4586	20 09 55.0	13.203	12	16 54 39.13	2.5951	27 35 42.6	4.993
13	14 55 00.25	2.4630	20 23 03.0	13.062	13	16 57 14.84	2.5953	27 40 36.6	4.805
14	14 57 28.16	2.4674	20 36 02.4	12.917	14	16 59 50.56	2.5953	27 45 19.2	4.616
15	14 59 56.34	2.4718	20 48 53.0	12.771	15	17 02 26.27	2.5951	27 49 50.5	4.428
16	15 02 24.78	2.4762	21 01 34.9	12.624	16	17 05 01.97	2.5948	27 54 10.5	4.240
17	15 04 53.48	2.4805	21 14 07.9	12.475	17	17 07 37.65	2.5944	27 58 19.3	4.052
18	15 07 22.44	2.4848	21 26 31.9	12.324	18	17 10 13.30	2.5938	28 02 16.7	3.863
19	15 09 51.66	2.4890	21 38 46.8	12.173	19	17 12 48.91	2.5931	28 06 02.8	3.675
20	15 12 21.12	2.4932	21 50 52.6	12.019	20	17 15 24.47	2.5923	28 09 37.7	3.487
21	15 14 50.84	2.4973	22 02 49.1	11.864	21	17 17 59.98	2.5913	28 13 01.2	3.298
22	15 17 20.80	2.5015	22 14 36.3	11.708	22	17 20 35.43	2.5902	28 16 13.5	3.111
23	15 19 51.02	2.5056	22 26 14.1	11.551	23	17 23 10.80	2.5888	28 19 14.5	2.923
24	15 22 21.47	2.5095	22 37 42.4	11.392	24	17 25 46.09	2.5874	28 22 04.3	2.736

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Friday, October 16.					Sunday, October 18.				
00	17 25 46.09	2.5874	-28 22 04.3	-2.736	00	19 25 45.33	2.3695	-27 09 50.8	+5.378
01	17 28 21.29	2.5858	28 24 42.8	2.548	01	19 28 07.30	2.3627	27 04 23.8	5.521
02	17 30 56.39	2.5841	28 27 10.1	2.362	02	19 30 28.85	2.3558	26 58 48.3	5.662
03	17 33 31.38	2.5822	28 29 26.2	2.176	03	19 32 50.00	2.3491	26 53 04.4	5.801
04	17 36 06.25	2.5802	28 31 31.2	1.990	04	19 35 10.74	2.3422	26 47 12.2	5.938
05	17 38 41.00	2.5780	28 33 25.0	1.803	05	19 37 31.06	2.3353	26 41 11.8	6.075
06	17 41 15.61	2.5756	28 35 07.6	1.618	06	19 39 50.97	2.3283	26 35 03.2	6.211
07	17 43 50.07	2.5732	28 36 39.2	1.435	07	19 42 10.46	2.3213	26 28 46.5	6.344
08	17 46 24.39	2.5706	28 37 59.8	1.251	08	19 44 29.53	2.3143	26 22 21.9	6.477
09	17 48 58.54	2.5678	28 39 09.3	1.067	09	19 46 48.18	2.3073	26 15 49.3	6.608
10	17 51 32.53	2.5650	28 40 07.8	0.884	10	19 49 06.40	2.3002	26 09 08.9	6.738
11	17 54 06.34	2.5619	28 40 55.4	0.702	11	19 51 24.20	2.2931	26 02 20.7	6.867
12	17 56 39.06	2.5588	28 41 32.0	0.520	12	19 53 41.57	2.2860	25 55 24.9	6.993
13	17 59 13.39	2.5555	28 41 57.8	0.339	13	19 55 58.52	2.2789	25 48 21.5	7.120
14	18 01 46.62	2.5520	28 42 12.7	-0.158	14	19 58 15.04	2.2717	25 41 10.5	7.244
15	18 04 19.63	2.5484	28 42 16.8	+0.021	15	20 00 31.12	2.2645	25 33 52.2	7.367
16	18 06 52.43	2.5447	28 42 10.2	0.199	16	20 02 46.78	2.2574	25 26 26.5	7.489
17	18 09 24.99	2.5408	28 41 52.9	0.377	17	20 05 02.01	2.2503	25 18 53.5	7.610
18	18 11 57.33	2.5369	28 41 25.0	0.554	18	20 07 16.81	2.2431	25 11 13.3	7.728
19	18 14 29.42	2.5328	28 40 46.4	0.730	19	20 09 31.18	2.2359	25 03 26.1	7.846
20	18 17 01.27	2.5287	28 39 57.4	0.905	20	20 11 45.12	2.2288	24 55 31.8	7.963
21	18 19 32.86	2.5243	28 38 57.8	1.080	21	20 13 58.63	2.2217	24 47 30.5	8.078
22	18 22 04.18	2.5198	28 37 47.8	1.253	22	20 16 11.72	2.2145	24 39 22.4	8.192
23	18 24 35.24	2.5153	-28 36 27.4	+1.427	23	20 18 24.37	2.2073	-24 31 07.5	+8.304
Saturday, October 17.					Monday, October 19.				
00	18 27 06.01	2.5105	-28 34 56.6	+1.598	00	20 20 36.59	2.2002	-24 22 45.9	+8.415
01	18 29 36.50	2.5058	28 33 15.6	1.768	01	20 22 48.39	2.1931	24 14 17.7	8.525
02	18 32 06.70	2.5008	28 31 24.4	1.938	02	20 24 59.76	2.1859	24 05 42.9	8.634
03	18 34 36.59	2.4957	28 29 23.0	2.107	03	20 27 10.70	2.1788	23 57 01.6	8.741
04	18 37 06.18	2.4906	28 27 11.6	2.274	04	20 29 21.21	2.1718	23 48 14.0	8.847
05	18 39 35.46	2.4853	28 24 50.1	2.441	05	20 31 31.31	2.1648	23 39 20.0	8.952
06	18 42 04.42	2.4800	28 22 18.7	2.606	06	20 33 40.98	2.1576	23 30 19.8	9.055
07	18 44 33.06	2.4746	28 19 37.4	2.771	07	20 35 50.22	2.1506	23 21 13.4	9.158
08	18 47 01.37	2.4690	28 16 46.2	2.933	08	20 37 59.05	2.1437	23 12 00.9	9.258
09	18 49 29.34	2.4634	28 13 45.4	3.095	09	20 40 07.46	2.1368	23 02 42.5	9.357
10	18 51 56.98	2.4578	28 10 34.8	3.257	10	20 42 15.46	2.1298	22 53 18.1	9.456
11	18 54 24.27	2.4518	28 07 14.6	3.416	11	20 44 23.04	2.1228	22 43 47.8	9.553
12	18 56 51.20	2.4459	28 03 44.9	3.574	12	20 46 30.20	2.1159	22 34 11.8	9.648
13	18 59 17.78	2.4400	28 00 05.7	3.732	13	20 48 36.95	2.1092	22 24 30.1	9.743
14	19 01 44.00	2.4338	27 56 17.1	3.888	14	20 50 43.30	2.1024	22 14 42.7	9.836
15	19 04 09.84	2.4277	27 52 19.2	4.043	15	20 52 49.24	2.0956	22 04 49.8	9.928
16	19 06 35.32	2.4216	27 48 12.0	4.196	16	20 54 54.77	2.0888	21 54 51.4	10.018
17	19 09 00.43	2.4153	27 43 55.7	4.348	17	20 56 59.90	2.0822	21 44 47.6	10.108
18	19 11 25.15	2.4089	27 39 30.3	4.499	18	20 59 04.63	2.0755	21 34 38.4	10.197
19	19 13 49.50	2.4025	27 34 55.8	4.649	19	21 01 08.96	2.0689	21 24 24.0	10.283
20	19 16 13.45	2.3960	27 30 12.4	4.798	20	21 03 12.90	2.0624	21 14 04.4	10.370
21	19 18 37.02	2.3895	-27 25 20.1	4.944	21	21 05 16.45	2.0559	21 03 39.6	10.455
22	19 21 00.19	2.3828	27 20 19.1	5.091	22	21 07 19.61	2.0494	20 53 09.8	10.538
23	19 23 22.96	2.3762	27 15 09.2	5.236	23	21 09 22.38	2.0430	20 42 35.0	10.621
24	19 25 45.33	2.3695	-27 09 50.8	+5.378	24	21 11 24.77	2.0367	-20 31 55.3	+10.702

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Tuesday, October 20.					Thursday, October 22.				
00	21 11 24.77	2.0367	-20 31 55.3	+10.702	00	22 42 57.40	1.8029	-10 44 32.9	+13.404
01	21 13 26.78	2.0303	20 21 10.8	10.783	01	22 44 45.48	1.7998	10 31 07.6	13.438
02	21 15 28.41	2.0241	20 10 21.4	10.862	02	22 46 33.37	1.7966	10 17 40.3	13.472
03	21 17 29.67	2.0178	19 59 27.4	10.939	03	22 48 21.07	1.7936	10 04 11.0	13.504
04	21 19 30.55	2.0117	19 48 28.7	11.016	04	22 50 08.60	1.7906	9 50 39.8	13.536
05	21 21 31.07	2.0056	19 37 25.5	11.092	05	22 51 55.94	1.7876	9 37 06.7	13.567
06	21 23 31.22	1.9995	19 26 17.7	11.167	06	22 53 43.11	1.7848	9 23 31.8	13.598
07	21 25 31.01	1.9936	19 15 05.5	11.239	07	22 55 30.12	1.7821	9 09 55.0	13.628
08	21 27 30.45	1.9877	19 03 49.0	11.312	08	22 57 16.96	1.7793	8 56 16.5	13.656
09	21 29 29.53	1.9817	18 52 28.1	11.383	09	22 59 03.64	1.7768	8 42 36.3	13.683
10	21 31 28.25	1.9758	18 41 03.0	11.453	10	23 00 50.17	1.7743	8 28 54.5	13.711
11	21 33 26.63	1.9701	18 29 33.7	11.523	11	23 02 36.55	1.7718	8 15 11.0	13.738
12	21 35 24.66	1.9643	18 18 00.3	11.591	12	23 04 22.78	1.7693	8 01 26.0	13.763
13	21 37 22.35	1.9588	18 06 22.8	11.658	13	23 06 08.87	1.7670	7 47 39.4	13.788
14	21 39 19.71	1.9532	17 54 41.4	11.723	14	23 07 54.82	1.7648	7 33 51.4	13.812
15	21 41 16.73	1.9477	17 42 56.0	11.789	15	23 09 40.64	1.7625	7 20 02.0	13.835
16	21 43 13.43	1.9422	17 31 06.7	11.853	16	23 11 26.32	1.7604	7 06 11.2	13.858
17	21 45 09.79	1.9368	17 19 13.7	11.915	17	23 13 11.89	1.7584	6 52 19.0	13.880
18	21 47 05.84	1.9315	17 07 16.9	11.978	18	23 14 57.33	1.7563	6 38 25.6	13.901
19	21 49 01.57	1.9262	16 55 16.4	12.039	19	23 16 42.65	1.7545	6 24 30.9	13.922
20	21 50 56.98	1.9209	16 43 12.2	12.098	20	23 18 27.87	1.7527	6 10 35.0	13.941
21	21 52 52.08	1.9158	16 31 04.6	12.157	21	23 20 12.97	1.7509	5 56 38.0	13.960
22	21 54 46.88	1.9108	16 18 53.4	12.216	22	23 21 57.98	1.7493	5 42 39.8	13.978
23	21 56 41.38	1.9058	-16 06 38.7	+12.273	23	23 23 42.88	1.7476	-5 28 40.6	+13.996
Wednesday, October 21.					Friday, October 23.				
00	21 58 35.57	1.9008	-15 54 20.7	+12.328	00	23 25 27.69	1.7461	-5 14 40.3	+14.013
01	22 00 29.47	1.8959	15 41 59.3	12.383	01	23 27 12.41	1.7446	5 00 39.1	14.028
02	22 02 23.08	1.8912	15 29 34.7	12.438	02	23 28 57.04	1.7432	4 46 36.9	14.044
03	22 04 16.41	1.8864	15 17 06.8	12.491	03	23 30 41.59	1.7418	4 32 33.8	14.058
04	22 06 09.45	1.8818	15 04 35.8	12.543	04	23 32 26.06	1.7406	4 18 29.9	14.072
05	22 08 02.22	1.8772	14 52 01.7	12.594	05	23 34 10.46	1.7394	4 04 25.2	14.085
06	22 09 54.71	1.8726	14 39 24.5	12.645	06	23 35 54.79	1.7383	3 50 19.7	14.098
07	22 11 46.93	1.8681	14 26 44.3	12.695	07	23 37 39.05	1.7373	3 36 13.5	14.109
08	22 13 38.88	1.8638	14 14 01.1	12.744	08	23 39 23.26	1.7363	3 22 06.6	14.120
09	22 15 30.58	1.8594	14 01 15.0	12.791	09	23 41 07.40	1.7353	3 07 59.1	14.131
10	22 17 22.01	1.8551	13 48 26.2	12.838	10	23 42 51.50	1.7346	2 53 50.9	14.140
11	22 19 13.19	1.8509	13 35 34.5	12.884	11	23 44 35.55	1.7338	2 39 42.3	14.148
12	22 21 04.12	1.8468	13 22 40.1	12.929	12	23 46 19.55	1.7330	2 25 33.1	14.157
13	22 22 54.81	1.8428	13 09 43.0	12.973	13	23 48 03.51	1.7324	2 11 23.5	14.164
14	22 24 45.25	1.8388	12 56 43.3	13.017	14	23 49 47.44	1.7319	1 57 13.4	14.171
15	22 26 35.46	1.8349	12 43 41.0	13.059	15	23 51 31.34	1.7315	1 43 03.0	14.177
16	22 28 25.44	1.8311	12 30 36.2	13.101	16	23 53 15.22	1.7311	1 28 52.2	14.183
17	22 30 15.19	1.8273	12 17 28.9	13.142	17	23 54 59.07	1.7307	1 14 41.1	14.187
18	22 32 04.71	1.8236	12 04 19.2	13.181	18	23 56 42.90	1.7304	1 00 29.8	14.190
19	22 33 54.02	1.8200	11 51 07.2	13.220	19	23 58 26.72	1.7303	0 46 18.3	14.193
20	22 35 43.11	1.8163	11 37 52.8	13.259	20	00 00 10.53	1.7301	0 32 06.6	14.195
21	22 37 31.98	1.8129	11 24 36.1	13.297	21	00 01 54.33	1.7300	0 17 54.9	14.197
22	22 39 20.66	1.8096	11 11 17.2	13.333	22	00 03 38.13	1.7300	-0 03 43.0	14.198
23	22 41 09.13	1.8062	10 57 56.1	13.369	23	00 05 21.93	1.7301	+0 10 28.8	14.198
24	22 42 57.40	1.8029	-10 44 32.9	+13.404	24	00 07 05.74	1.7303	+0 24 40.7	+14.198

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Saturday, October 24.					Monday, October 26.				
00	00 07 05.74	1.7303	+ 0 24 40.7	+14.198	00	01 31 36.50	1.8167	+11 31 11.5	+13.272
01	00 08 49.56	1.7304	0 38 52.5	14.196	01	01 33 25.60	1.8200	11 44 26.6	13.233
02	00 10 33.39	1.7307	0 53 04.2	14.194	02	01 35 14.90	1.8234	11 57 39.4	13.193
03	00 12 17.24	1.7311	1 07 15.8	14.192	03	01 37 04.41	1.8269	12 10 49.7	13.151
04	00 14 01.12	1.7316	1 21 27.2	14.188	04	01 38 54.13	1.8305	12 23 57.5	13.109
05	00 15 45.03	1.7320	1 35 38.3	14.183	05	01 40 44.07	1.8341	12 37 02.8	13.067
06	00 17 28.96	1.7325	1 49 49.2	14.178	06	01 42 34.22	1.8378	12 50 05.5	13.023
07	00 19 12.93	1.7333	2 03 59.7	14.173	07	01 44 24.60	1.8416	13 03 05.5	12.978
08	00 20 56.95	1.7339	2 18 09.9	14.166	08	01 46 15.21	1.8454	13 16 02.8	12.932
09	00 22 41.00	1.7346	2 32 19.6	14.158	09	01 48 06.05	1.8493	13 28 57.3	12.885
10	00 24 25.10	1.7355	2 46 28.9	14.151	10	01 49 57.12	1.8531	13 41 49.0	12.838
11	00 26 09.26	1.7364	3 00 37.7	14.143	11	01 51 48.42	1.8571	13 54 37.8	12.789
12	00 27 53.47	1.7373	3 14 46.0	14.133	12	01 53 39.97	1.8612	14 07 23.7	12.740
13	00 29 37.74	1.7384	3 28 53.7	14.123	13	01 55 31.76	1.8653	14 20 06.6	12.690
14	00 31 22.08	1.7396	3 43 00.7	14.112	14	01 57 23.80	1.8693	14 32 46.5	12.638
15	00 33 06.49	1.7407	3 57 07.1	14.101	15	01 59 16.08	1.8736	14 45 23.2	12.586
16	00 34 50.96	1.7419	4 11 12.8	14.088	16	02 01 08.63	1.8778	14 57 56.8	12.533
17	00 36 35.52	1.7433	4 25 17.6	14.074	17	02 03 01.42	1.8821	15 10 27.2	12.478
18	00 38 20.16	1.7447	4 39 21.7	14.061	18	02 04 54.48	1.8865	15 22 54.2	12.423
19	00 40 04.88	1.7460	4 53 24.9	14.046	19	02 06 47.80	1.8908	15 35 18.0	12.368
20	00 41 49.68	1.7476	5 07 27.2	14.031	20	02 08 41.38	1.8953	15 47 38.3	12.310
21	00 43 34.59	1.7493	5 21 28.6	14.014	21	02 10 35.24	1.8999	15 59 55.2	12.252
22	00 45 19.59	1.7508	5 35 28.9	13.997	22	02 12 29.37	1.9044	16 12 08.5	12.193
23	00 47 04.69	1.7525	+ 5 49 28.2	+13.979	23	02 14 23.77	1.9090	+16 24 18.3	+12.133
Sunday, October 25.					Tuesday, October 27.				
00	00 48 49.89	1.7543	+ 6 03 26.4	+13.961	00	02 16 18.45	1.9137	+16 36 24.5	+12.073
01	00 50 35.20	1.7562	6 17 23.5	13.942	01	02 18 13.41	1.9184	16 48 27.0	12.010
02	00 52 20.63	1.7581	6 31 19.4	13.922	02	02 20 08.66	1.9232	17 00 25.7	11.946
03	00 54 06.17	1.7601	6 45 14.1	13.901	03	02 22 04.19	1.9279	17 12 20.5	11.882
04	00 55 51.84	1.7622	6 59 07.5	13.878	04	02 24 00.01	1.9328	17 24 11.5	11.817
05	00 57 37.63	1.7642	7 12 59.5	13.856	05	02 25 56.13	1.9377	17 35 58.5	11.751
06	00 59 23.54	1.7663	7 26 50.2	13.833	06	02 27 52.53	1.9426	17 47 41.6	11.684
07	01 01 09.59	1.7687	7 40 39.5	13.809	07	02 29 49.24	1.9477	17 59 20.6	11.615
08	01 02 55.78	1.7709	7 54 27.3	13.784	08	02 31 46.25	1.9527	18 10 55.4	11.546
09	01 04 42.10	1.7733	8 08 13.6	13.758	09	02 33 43.56	1.9577	18 22 26.1	11.476
10	01 06 28.58	1.7758	8 21 58.3	13.732	10	02 35 41.17	1.9628	18 33 52.5	11.404
11	01 08 15.20	1.7783	8 35 41.4	13.704	11	02 37 39.10	1.9680	18 45 14.6	11.332
12	01 10 01.97	1.7808	8 49 22.8	13.676	12	02 39 37.33	1.9732	18 56 32.3	11.258
13	01 11 48.90	1.7835	9 03 02.5	13.647	13	02 41 35.88	1.9784	19 07 45.6	11.183
14	01 13 35.99	1.7862	9 16 40.4	13.617	14	02 43 34.74	1.9837	19 18 54.3	11.108
15	01 15 23.24	1.7889	9 30 16.5	13.587	15	02 45 33.92	1.9890	19 29 58.5	11.032
16	01 17 10.66	1.7918	9 43 50.8	13.555	16	02 47 33.42	1.9943	19 40 58.1	10.953
17	01 18 58.25	1.7947	9 57 23.1	13.523	17	02 49 33.24	1.9998	19 51 52.9	10.874
18	01 20 46.02	1.7976	10 10 53.5	13.490	18	02 51 33.39	2.0051	20 02 43.0	10.794
19	01 22 33.96	1.8006	10 24 21.9	13.455	19	02 53 33.85	2.0105	20 13 28.2	10.713
20	01 24 22.09	1.8037	10 37 48.1	13.420	20	02 55 34.65	2.0161	20 24 08.6	10.632
21	01 26 10.40	1.8068	10 51 12.3	13.385	21	02 57 35.78	2.0215	20 34 44.0	10.548
22	01 27 58.91	1.8100	11 04 34.3	13.348	22	02 59 37.23	2.0270	20 45 14.4	10.464
23	01 29 47.60	1.8133	11 17 54.0	13.310	23	03 01 39.02	2.0326	20 55 39.7	10.378
24	01 31 36.50	1.8167	+11 31 11.5	+13.272	24	03 03 41.14	2.0382	+21 05 59.8	+10.292

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Wednesday, October 28.					Friday, October 30.				
00	03 03 41.14	2.0382	+21 05 59.8	+10.292	00	04 48 02.52	2.3036	+27 19 06.6	+4.836
01	03 05 43.60	2.0438	21 16 14.7	10.204	01	04 50 20.88	2.3083	27 23 52.6	4.697
02	03 07 46.39	2.0493	21 26 24.3	10.116	02	04 52 39.51	2.3129	27 28 30.2	4.556
03	03 09 49.52	2.0550	21 36 28.6	10.026	03	04 54 58.43	2.3176	27 32 59.3	4.415
04	03 11 52.99	2.0607	21 46 27.4	9.934	04	04 57 17.62	2.3220	27 37 20.0	4.273
05	03 13 56.80	2.0663	21 56 20.7	9.843	05	04 59 37.07	2.3264	27 41 32.0	4.129
06	03 16 00.95	2.0721	22 06 08.5	9.749	06	05 01 56.79	2.3308	27 45 35.5	3.987
07	03 18 05.45	2.0778	22 15 50.6	9.654	07	05 04 16.77	2.3351	27 49 30.4	3.842
08	03 20 10.29	2.0835	22 25 27.0	9.559	08	05 06 37.00	2.3393	27 53 16.5	3.696
09	03 22 15.47	2.0892	22 34 57.7	9.463	09	05 08 57.49	2.3435	27 56 53.9	3.550
10	03 24 20.99	2.0949	22 44 22.6	9.365	10	05 11 18.22	2.3475	28 00 22.5	3.403
11	03 26 26.86	2.1008	22 53 41.5	9.266	11	05 13 39.19	2.3514	28 03 42.2	3.255
12	03 28 33.08	2.1065	23 02 54.5	9.167	12	05 16 00.39	2.3553	28 06 53.1	3.107
13	03 30 39.64	2.1123	23 12 01.5	9.065	13	05 18 21.82	2.3591	28 09 55.0	2.957
14	03 32 46.55	2.1181	23 21 02.3	8.963	14	05 20 43.48	2.3628	28 12 47.9	2.807
15	03 34 53.81	2.1238	23 29 57.0	8.859	15	05 23 05.36	2.3665	28 15 31.8	2.656
16	03 37 01.41	2.1296	23 38 45.4	8.754	16	05 25 27.46	2.3700	28 18 06.6	2.504
17	03 39 09.36	2.1354	23 47 27.5	8.649	17	05 27 49.76	2.3733	28 20 32.3	2.352
18	03 41 17.66	2.1412	23 56 03.3	8.543	18	05 30 12.26	2.3767	28 22 48.8	2.198
19	03 43 26.30	2.1469	24 04 32.6	8.434	19	05 32 34.96	2.3800	28 24 56.1	2.045
20	03 45 35.29	2.1527	24 12 55.4	8.326	20	05 34 57.86	2.3831	28 26 54.2	1.892
21	03 47 44.62	2.1584	24 21 11.7	8.216	21	05 37 20.93	2.3861	28 28 43.1	1.737
22	03 49 54.30	2.1642	24 29 21.3	8.104	22	05 39 44.19	2.3890	28 30 22.6	1.581
23	03 52 04.32	2.1699	+24 37 24.2	+7.992	23	05 42 07.61	2.3918	+28 31 52.8	+1.425
Thursday, October 29.					Saturday, October 31.				
00	03 54 14.69	2.1757	+24 45 20.3	+7.878	00	05 44 31.21	2.3947	+28 33 13.6	+1.268
01	03 56 25.40	2.1813	24 53 09.6	7.764	01	05 46 54.97	2.3973	28 34 25.0	1.112
02	03 58 36.45	2.1870	25 00 52.0	7.648	02	05 49 18.88	2.3998	28 35 27.0	0.954
03	04 00 47.84	2.1927	25 08 27.4	7.532	03	05 51 42.94	2.4022	28 36 19.5	0.795
04	04 02 59.57	2.1983	25 15 55.8	7.413	04	05 54 07.14	2.4045	28 37 02.4	0.637
05	04 05 11.04	2.2040	25 23 17.0	7.294	05	05 56 31.48	2.4068	28 37 35.9	0.478
06	04 07 24.05	2.2096	25 30 31.1	7.175	06	05 58 55.95	2.4088	28 37 59.8	0.318
07	04 09 36.79	2.2152	25 37 38.0	7.054	07	06 01 20.54	2.4108	28 38 14.1	+0.158
08	04 11 49.87	2.2207	25 44 37.6	6.932	08	06 03 45.25	2.4127	28 38 18.8	-0.002
09	04 14 03.27	2.2262	25 51 29.8	6.808	09	06 06 10.06	2.4144	28 38 13.9	0.162
10	04 16 17.01	2.2317	25 58 14.6	6.684	10	06 08 34.08	2.4162	28 37 59.4	0.323
11	04 18 31.07	2.2371	26 04 51.9	6.558	11	06 11 00.00	2.4178	28 37 35.2	0.484
12	04 20 45.46	2.2425	26 11 21.6	6.432	12	06 13 25.11	2.4192	28 37 01.3	0.646
13	04 23 00.17	2.2479	26 17 43.7	6.305	13	06 15 50.30	2.4205	28 36 17.7	0.808
14	04 25 15.21	2.2533	26 23 58.2	6.177	14	06 18 15.57	2.4218	28 35 24.4	0.970
15	04 27 30.56	2.2584	26 30 04.9	6.047	15	06 20 40.91	2.4228	28 34 21.3	1.133
16	04 29 46.22	2.2637	26 36 03.8	5.916	16	06 23 06.31	2.4238	28 33 08.5	1.294
17	04 32 02.20	2.2689	26 41 54.8	5.784	17	06 25 31.76	2.4247	28 31 46.0	1.457
18	04 34 18.49	2.2740	26 47 37.9	5.652	18	06 27 57.27	2.4255	28 30 13.6	1.621
19	04 36 35.08	2.2791	26 53 13.0	5.518	19	06 30 22.82	2.4262	28 28 31.5	1.783
20	04 38 51.97	2.2841	26 58 40.0	5.383	20	06 32 48.41	2.4268	28 26 39.7	1.946
21	04 41 09.17	2.2890	27 03 58.9	5.248	21	06 35 14.03	2.4273	28 24 38.0	2.110
22	04 43 26.66	2.2940	27 09 09.7	5.112	22	06 37 39.68	2.4276	28 22 26.5	2.273
23	04 45 44.45	2.2988	27 14 12.3	4.974	23	06 40 05.34	2.4278	28 20 05.3	2.436
24	04 48 02.52	2.3036	+27 19 06.6	+4.836	24	06 42 31.01	2.4279	+28 17 34.2	-2.600

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Sunday, November 1.					Tuesday, November 3.				
00	06 42 31.01	2.4279	+28 17 34.2	-2.600	00	08 37 25.07	2.3317	+23 09 33.3	-10.039
01	06 44 56.69	2.4279	28 14 53.3	2.763	01	08 39 44.87	2.3283	22 59 26.8	10.178
02	06 47 22.36	2.4278	28 12 02.7	2.926	02	08 42 04.47	2.3250	22 49 12.0	10.316
03	06 49 48.02	2.4276	28 09 02.2	3.090	03	08 44 23.87	2.3216	22 38 48.9	10.453
04	06 52 13.67	2.4273	28 05 51.9	3.253	04	08 46 43.06	2.3182	22 28 17.6	10.589
05	06 54 39.30	2.4269	28 02 31.9	3.415	05	08 49 02.05	2.3148	22 17 38.2	10.723
06	06 57 04.90	2.4263	27 59 02.1	3.578	06	08 51 20.83	2.3113	22 06 50.8	10.858
07	06 59 30.46	2.4258	27 55 22.5	3.742	07	08 53 39.41	2.3079	21 55 55.3	10.992
08	07 01 55.99	2.4251	27 51 33.1	3.904	08	08 55 57.78	2.3044	21 44 51.8	11.123
09	07 04 21.47	2.4243	27 47 34.0	4.066	09	08 58 15.94	2.3009	21 33 40.5	11.254
10	07 06 46.90	2.4233	27 43 25.2	4.228	10	09 00 33.89	2.2974	21 22 21.3	11.384
11	07 09 12.26	2.4223	27 39 06.6	4.391	11	09 02 51.63	2.2940	21 10 54.4	11.513
12	07 11 37.57	2.4213	27 34 38.3	4.553	12	09 05 09.17	2.2906	20 59 19.7	11.642
13	07 14 02.81	2.4200	27 30 00.3	4.714	13	09 07 26.50	2.2871	20 47 37.4	11.768
14	07 16 27.97	2.4187	27 25 12.6	4.875	14	09 09 43.62	2.2836	20 35 47.5	11.895
15	07 18 53.05	2.4173	27 20 15.3	5.036	15	09 12 00.53	2.2802	20 23 50.0	12.020
16	07 21 18.04	2.4158	27 15 08.3	5.197	16	09 14 17.24	2.2768	20 11 45.1	12.143
17	07 23 42.94	2.4143	27 09 51.7	5.357	17	09 16 33.74	2.2733	19 59 32.8	12.266
18	07 26 07.75	2.4126	27 04 25.5	5.516	18	09 18 50.04	2.2700	19 47 13.2	12.387
19	07 28 32.45	2.4108	26 58 49.8	5.676	19	09 21 06.14	2.2666	19 34 46.4	12.508
20	07 30 57.04	2.4090	26 53 04.4	5.835	20	09 23 22.03	2.2632	19 22 12.3	12.628
21	07 33 21.53	2.4071	26 47 09.6	5.993	21	09 25 37.72	2.2598	19 09 31.1	12.745
22	07 35 45.89	2.4051	26 41 05.2	6.152	22	09 27 53.21	2.2566	18 56 42.9	12.862
23	07 38 10.14	2.4030	+26 34 51.4	-6.309	23	09 30 08.51	2.2533	+18 43 47.7	-12.978
Monday, November 2.					Wednesday, November 4.				
00	07 40 34.25	2.4008	+26 28 28.1	-6.467	00	09 32 23.60	2.2499	+18 30 45.5	-13.093
01	07 42 58.24	2.3986	26 21 55.4	6.623	01	09 34 38.50	2.2468	18 17 36.5	13.207
02	07 45 22.08	2.3963	26 15 13.3	6.779	02	09 36 53.21	2.2436	18 04 20.7	13.319
03	07 47 45.79	2.3939	26 08 21.9	6.934	03	09 39 07.73	2.2403	17 50 58.2	13.430
04	07 50 09.35	2.3915	26 01 21.2	7.089	04	09 41 22.05	2.2372	17 37 29.1	13.540
05	07 52 32.77	2.3890	25 54 11.2	7.244	05	09 43 36.19	2.2341	17 23 53.4	13.648
06	07 54 56.03	2.3864	25 46 51.9	7.398	06	09 45 50.14	2.2310	17 10 11.3	13.756
07	07 57 19.14	2.3838	25 39 23.5	7.550	07	09 48 03.91	2.2280	16 56 22.7	13.863
08	07 59 42.09	2.3811	25 31 45.9	7.703	08	09 50 17.50	2.2250	16 42 27.7	13.968
09	08 02 04.87	2.3783	25 23 59.1	7.855	09	09 52 30.91	2.2221	16 28 26.5	14.072
10	08 04 27.49	2.3756	25 16 03.3	8.005	10	09 54 44.15	2.2192	16 14 19.1	14.174
11	08 06 49.94	2.3727	25 07 58.5	8.156	11	09 56 57.21	2.2163	16 00 05.6	14.276
12	08 09 12.21	2.3698	24 59 44.6	8.306	12	09 59 10.10	2.2134	15 45 46.0	14.377
13	08 11 34.31	2.3668	24 51 21.8	8.454	13	10 01 22.82	2.2107	15 31 20.4	14.475
14	08 13 56.23	2.3638	24 42 50.1	8.603	14	10 03 35.38	2.2079	15 16 49.0	14.573
15	08 16 17.97	2.3608	24 34 09.5	8.750	15	10 05 47.77	2.2053	15 02 11.7	14.669
16	08 18 39.52	2.3577	24 25 20.1	8.897	16	10 08 00.01	2.2027	14 47 28.7	14.764
17	08 21 00.89	2.3546	24 16 21.9	9.043	17	10 10 12.09	2.2001	14 32 40.0	14.858
18	08 23 22.07	2.3514	24 07 15.0	9.187	18	10 12 24.02	2.1975	14 17 45.8	14.950
19	08 25 43.06	2.3483	23 57 59.5	9.331	19	10 14 35.79	2.1951	14 02 46.0	15.042
20	08 28 03.86	2.3450	23 48 35.3	9.475	20	10 16 47.43	2.1927	13 47 40.8	15.131
21	08 30 24.46	2.3417	23 39 02.5	9.618	21	10 18 58.92	2.1903	13 32 30.3	15.219
22	08 32 44.86	2.3384	23 29 21.2	9.758	22	10 21 10.27	2.1881	13 17 14.5	15.307
23	08 35 05.07	2.3351	23 19 31.5	9.899	23	10 23 21.49	2.1858	13 01 53.5	15.393
24	08 37 25.07	2.3317	+23 09 33.3	-10.039	24	10 25 32.57	2.1837	+12 46 27.4	-15.477

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Thursday, November 5.					Saturday, November 7.				
00	10 25 32.57	2.1837	+ 12 46 27.4	-15.477	00	12 09 16.03	2.1695	- 0 45 40.3	-17.753
01	10 27 43.53	2.1816	12 30 56.3	15.560	01	12 11 26.25	2.1713	1 03 25.7	17.760
02	10 29 54.36	2.1795	12 15 20.2	15.642	02	12 13 36.59	2.1733	1 21 11.5	17.764
03	10 32 05.07	2.1776	11 59 39.3	15.721	03	12 15 47.04	2.1752	1 38 57.4	17.768
04	10 34 15.67	2.1757	11 43 53.7	15.800	04	12 17 57.61	2.1773	1 56 43.6	17.769
05	10 36 26.15	2.1738	11 28 03.3	15.878	05	12 20 08.31	2.1794	2 14 29.7	17.767
06	10 38 36.53	2.1721	11 12 08.4	15.953	06	12 22 19.14	2.1816	2 32 15.6	17.764
07	10 40 46.80	2.1704	10 56 08.9	16.028	07	12 24 30.10	2.1839	2 50 01.4	17.761
08	10 42 56.98	2.1688	10 40 05.0	16.102	08	12 26 41.21	2.1864	3 07 46.9	17.754
09	10 45 07.06	2.1672	10 23 56.7	16.173	09	12 28 52.47	2.1889	3 25 31.9	17.745
10	10 47 17.04	2.1657	10 07 44.2	16.243	10	12 31 03.88	2.1914	3 43 16.3	17.734
11	10 49 26.94	2.1643	9 51 27.5	16.313	11	12 33 15.44	2.1941	4 01 00.0	17.723
12	10 51 36.76	2.1630	9 35 06.7	16.380	12	12 35 27.17	2.1969	4 18 43.0	17.709
13	10 53 46.50	2.1618	9 18 41.9	16.445	13	12 37 39.07	2.1998	4 36 25.1	17.693
14	10 55 56.17	2.1606	9 02 13.3	16.510	14	12 39 51.14	2.2027	4 54 06.1	17.674
15	10 58 05.77	2.1594	8 45 40.7	16.573	15	12 42 03.39	2.2057	5 11 46.0	17.654
16	11 00 15.30	2.1584	8 29 04.5	16.634	16	12 44 15.82	2.2088	5 29 24.6	17.633
17	11 02 24.78	2.1575	8 12 24.6	16.694	17	12 46 28.44	2.2120	5 47 01.9	17.608
18	11 04 34.20	2.1566	7 55 41.2	16.753	18	12 48 41.26	2.2153	6 04 37.6	17.582
19	11 06 43.57	2.1558	7 38 54.3	16.810	19	12 50 54.27	2.2186	6 22 11.7	17.554
20	11 08 52.90	2.1551	7 22 04.0	16.866	20	12 53 07.49	2.2220	6 39 44.1	17.524
21	11 11 02.18	2.1544	7 05 10.4	16.919	21	12 55 20.91	2.2255	6 57 14.6	17.492
22	11 13 11.43	2.1539	6 48 13.7	16.971	22	12 57 34.55	2.2292	7 14 43.1	17.458
23	11 15 20.65	2.1534	+ 6 31 13.9	-17.022	23	12 59 48.41	2.2328	- 7 32 09.6	-17.423
Friday, November 6.					Sunday, November 8.				
00	11 17 29.84	2.1530	+ 6 14 11.1	-17.071	00	13 02 02.49	2.2366	- 7 49 33.8	-17.384
01	11 19 39.01	2.1528	5 57 05.4	17.118	01	13 04 16.80	2.2404	8 06 55.7	17.344
02	11 21 48.17	2.1525	5 39 56.9	17.165	02	13 06 31.34	2.2443	8 24 15.1	17.302
03	11 23 57.31	2.1523	5 22 45.6	17.209	03	13 08 46.12	2.2483	8 41 31.9	17.258
04	11 26 06.45	2.1523	5 05 31.8	17.252	04	13 11 01.14	2.2523	8 58 46.0	17.212
05	11 28 15.59	2.1524	4 48 15.4	17.293	05	13 13 16.40	2.2565	9 15 57.3	17.163
06	11 30 24.74	2.1525	4 30 56.6	17.333	06	13 15 31.92	2.2608	9 33 05.6	17.113
07	11 32 33.89	2.1527	4 13 35.5	17.370	07	13 17 47.69	2.2651	9 50 10.8	17.060
08	11 34 43.06	2.1529	3 56 12.2	17.407	08	13 20 03.73	2.2694	10 07 12.8	17.005
09	11 36 52.24	2.1533	3 38 46.7	17.442	09	13 22 20.02	2.2738	10 24 11.4	16.948
10	11 39 01.46	2.1538	3 21 19.2	17.474	10	13 24 36.59	2.2784	10 41 06.6	16.889
11	11 41 10.70	2.1543	3 03 49.8	17.505	11	13 26 53.43	2.2829	10 57 58.1	16.828
12	11 43 19.98	2.1550	2 46 18.6	17.534	12	13 29 10.54	2.2875	11 14 46.0	16.766
13	11 45 29.30	2.1557	2 28 45.7	17.562	13	13 31 27.93	2.2923	11 31 30.0	16.700
14	11 47 38.66	2.1565	2 11 11.2	17.588	14	13 33 45.61	2.2970	11 48 10.0	16.633
15	11 49 48.08	2.1574	1 53 35.1	17.613	15	13 36 03.57	2.3018	12 04 46.0	16.563
16	11 51 57.55	2.1584	1 35 57.6	17.636	16	13 38 21.83	2.3068	12 21 17.6	16.492
17	11 54 07.09	2.1595	1 18 18.8	17.657	17	13 40 40.38	2.3117	12 37 45.0	16.418
18	11 56 16.69	2.1607	1 00 38.8	17.675	18	13 42 59.23	2.3167	12 54 07.8	16.342
19	11 58 26.37	2.1620	0 42 57.8	17.693	19	13 45 18.38	2.3218	13 10 26.0	16.264
20	12 00 36.13	2.1633	0 25 15.7	17.708	20	13 47 37.84	2.3268	13 26 39.5	16.184
21	12 02 45.96	2.1647	+ 0 07 32.8	17.723	21	13 49 57.60	2.3320	13 42 48.1	16.103
22	12 04 55.89	2.1663	- 0 10 11.0	17.734	22	13 52 17.68	2.3372	13 58 51.8	16.018
23	12 07 05.91	2.1678	0 27 55.3	17.744	23	13 54 38.06	2.3424	14 14 50.2	15.931
24	12 09 16.03	2.1695	- 0 45 40.3	-17.753	24	13 56 58.77	2.3478	-14 30 43.5	-15.843

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Monday, November 9.					Wednesday, November 11.				
00	^h 13 ^m 56 ^s 58.77	2.3478	[°] 14 ['] 30 ["] 43.5	-15.843	00	^h 15 ^m 56 ^s 01.67	2.6028	[°] 24 ['] 50 ["] 12.7	-9.252
01	13 59 19.79	2.3531	14 46 31.3	15.752	01	15 58 37.96	2.6068	24 59 22.5	9.073
02	14 01 41.14	2.3586	15 02 13.7	15.659	02	16 01 14.48	2.6106	25 08 21.4	8.892
03	14 04 02.82	2.3640	15 17 50.4	15.563	03	16 03 51.23	2.6144	25 17 09.5	8.712
04	14 06 24.82	2.3693	15 33 21.3	15.466	04	16 06 28.21	2.6181	25 25 46.8	8.529
05	14 08 47.14	2.3748	15 48 46.3	15.368	05	16 09 05.40	2.6215	25 34 13.0	8.346
06	14 11 09.80	2.3805	16 04 05.4	15.267	06	16 11 42.79	2.6249	25 42 28.3	8.162
07	14 13 32.80	2.3860	16 19 18.3	15.163	07	16 14 20.39	2.6282	25 50 32.4	7.976
08	14 15 56.12	2.3915	16 34 24.9	15.057	08	16 16 58.17	2.6312	25 58 25.4	7.790
09	14 18 19.78	2.3972	16 49 25.1	14.948	09	16 19 36.13	2.6343	26 06 07.2	7.603
10	14 20 43.78	2.4028	17 04 18.7	14.839	10	16 22 14.28	2.6371	26 13 37.7	7.414
11	14 23 08.12	2.4085	17 19 05.8	14.728	11	16 24 52.58	2.6398	26 20 56.9	7.225
12	14 25 32.80	2.4142	17 33 46.0	14.613	12	16 27 31.05	2.6424	26 28 04.7	7.035
13	14 27 57.82	2.4198	17 48 19.4	14.498	13	16 30 09.67	2.6448	26 35 01.1	6.844
14	14 30 23.18	2.4255	18 02 45.7	14.379	14	16 32 48.42	2.6470	26 41 46.0	6.653
15	14 32 48.88	2.4313	18 17 04.9	14.259	15	16 35 27.31	2.6492	26 48 19.4	6.460
16	14 35 14.93	2.4370	18 31 16.8	14.137	16	16 38 06.32	2.6511	26 54 41.2	6.267
17	14 37 41.32	2.4428	18 45 21.3	14.013	17	16 40 45.44	2.6528	27 00 51.4	6.074
18	14 40 08.06	2.4484	18 59 18.3	13.886	18	16 43 24.66	2.6545	27 06 50.1	5.881
19	14 42 35.13	2.4541	19 13 07.6	13.758	19	16 46 03.98	2.6560	27 12 37.1	5.686
20	14 45 02.55	2.4598	19 26 49.2	13.628	20	16 48 43.38	2.6573	27 18 12.4	5.491
21	14 47 30.31	2.4655	19 40 23.0	13.496	21	16 51 22.85	2.6583	27 23 36.0	5.295
22	14 49 58.41	2.4713	19 53 48.7	13.362	22	16 54 02.38	2.6593	27 28 47.8	5.099
23	14 52 26.86	2.4769	20 07 06.4	13.226	23	16 56 41.97	2.6603	27 33 47.9	4.903
Tuesday, November 10.					Thursday, November 12.				
00	14 54 55.64	2.4825	20 20 15.8	-13.088	00	16 59 21.61	2.6609	27 38 36.2	-4.707
01	14 57 24.76	2.4882	20 33 16.9	12.948	01	17 02 01.28	2.6613	27 43 12.7	4.510
02	14 59 54.22	2.4938	20 46 09.5	12.805	02	17 04 40.92	2.6616	27 47 37.4	4.313
03	15 02 24.01	2.4993	20 58 53.5	12.662	03	17 07 20.67	2.6618	27 51 50.3	4.117
04	15 04 54.14	2.5048	21 11 28.9	12.517	04	17 10 00.38	2.6617	27 55 51.4	3.919
05	15 07 24.59	2.5103	21 23 55.5	12.368	05	17 12 40.07	2.6613	27 59 40.6	3.722
06	15 09 55.38	2.5158	21 36 13.1	12.219	06	17 15 19.74	2.6610	28 03 18.0	3.525
07	15 12 26.49	2.5212	21 48 21.8	12.068	07	17 17 59.39	2.6604	28 06 43.6	3.328
08	15 14 57.92	2.5265	22 00 21.3	11.915	08	17 20 38.99	2.6596	28 09 57.4	3.131
09	15 17 29.67	2.5318	22 12 11.6	11.761	09	17 23 18.54	2.6587	28 12 59.3	2.933
10	15 20 01.73	2.5371	22 23 52.6	11.605	10	17 25 58.03	2.6576	28 15 49.4	2.737
11	15 22 34.12	2.5423	22 35 24.2	11.447	11	17 28 37.45	2.6563	28 18 27.8	2.541
12	15 25 06.81	2.5474	22 46 46.2	11.287	12	17 31 16.79	2.6548	28 20 54.3	2.344
13	15 27 39.81	2.5525	22 57 58.6	11.126	13	17 33 56.03	2.6532	28 23 09.1	2.148
14	15 30 13.11	2.5575	23 09 01.3	10.963	14	17 36 35.17	2.6513	28 25 12.1	1.952
15	15 32 46.71	2.5625	23 19 54.1	10.798	15	17 39 14.19	2.6493	28 27 03.3	1.757
16	15 35 20.61	2.5673	23 30 37.0	10.632	16	17 41 53.09	2.6472	28 28 42.9	1.563
17	15 37 54.79	2.5720	23 41 09.9	10.465	17	17 44 31.85	2.6448	28 30 10.8	1.368
18	15 40 29.25	2.5767	23 51 32.8	10.296	18	17 47 10.46	2.6422	28 31 27.1	1.174
19	15 43 03.99	2.5813	24 01 45.4	10.124	19	17 49 48.91	2.6395	28 32 31.7	0.981
20	15 45 39.01	2.5858	24 11 47.7	9.953	20	17 52 27.20	2.6368	28 33 24.8	0.789
21	15 48 14.28	2.5902	24 21 39.7	9.780	21	17 55 05.32	2.6337	28 34 06.4	0.597
22	15 50 49.83	2.5945	24 31 21.3	9.605	22	17 57 43.24	2.6304	28 34 36.4	0.405
23	15 53 25.62	2.5987	24 40 52.3	9.428	23	18 00 20.97	2.6271	28 34 55.0	0.214
24	15 56 01.67	2.6028	24 50 12.7	-9.252	24	18 02 58.49	2.6235	28 35 02.1	-0.024

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Friday, November 13.					Sunday, November 15.				
00	18 02 58.49	2.6235	-28 35 02.1	-0.024	00	20 02 20.10	2.3148	-25 18 37.1	+7.683
01	18 05 35.79	2.6198	28 34 57.9	+0.165	01	20 04 38.75	2.3068	25 10 52.4	7.807
02	18 08 12.87	2.6159	28 34 42.3	0.353	02	20 06 56.92	2.2988	25 03 00.3	7.930
03	18 10 49.70	2.6118	28 34 15.5	0.541	03	20 09 14.61	2.2908	24 55 00.8	8.052
04	18 13 26.29	2.6077	28 33 37.4	0.728	04	20 11 31.82	2.2829	24 46 54.1	8.172
05	18 16 02.63	2.6034	28 32 48.2	0.913	05	20 13 48.56	2.2749	24 38 40.2	8.291
06	18 18 38.70	2.5989	28 31 47.9	1.098	06	20 16 04.81	2.2669	24 30 19.2	8.408
07	18 21 14.50	2.5943	28 30 36.5	1.282	07	20 18 20.59	2.2590	24 21 51.3	8.523
08	18 23 50.02	2.5896	28 29 14.1	1.463	08	20 20 35.89	2.2510	24 13 16.4	8.638
09	18 26 25.25	2.5846	28 27 40.9	1.645	09	20 22 50.71	2.2430	24 04 34.8	8.749
10	18 29 00.17	2.5795	28 25 56.7	1.826	10	20 25 05.05	2.2351	23 55 46.5	8.860
11	18 31 34.79	2.5743	28 24 01.8	2.006	11	20 27 18.92	2.2272	23 46 51.6	8.969
12	18 34 09.09	2.5690	28 21 56.0	2.185	12	20 29 32.31	2.2193	23 37 50.2	9.078
13	18 36 43.07	2.5635	28 19 39.6	2.361	13	20 31 45.23	2.2113	23 28 42.3	9.184
14	18 39 16.71	2.5578	28 17 12.7	2.537	14	20 33 57.67	2.2035	23 19 28.1	9.288
15	18 41 50.01	2.5521	28 14 35.2	2.713	15	20 36 09.65	2.1957	23 10 07.7	9.392
16	18 44 22.96	2.5463	28 11 47.2	2.886	16	20 38 21.15	2.1878	23 00 41.1	9.495
17	18 46 55.56	2.5403	28 08 48.9	3.058	17	20 40 32.19	2.1801	22 51 08.3	9.596
18	18 49 27.80	2.5343	28 05 40.3	3.228	18	20 42 42.76	2.1723	22 41 29.6	9.694
19	18 51 59.67	2.5280	28 02 21.5	3.398	19	20 44 52.87	2.1647	22 31 45.0	9.792
20	18 54 31.16	2.5218	27 58 52.5	3.567	20	20 47 02.52	2.1570	22 21 54.6	9.888
21	18 57 02.28	2.5153	27 55 13.5	3.733	21	20 49 11.71	2.1493	22 11 58.4	9.983
22	18 59 33.00	2.5088	27 51 24.6	3.898	22	20 51 20.44	2.1418	22 01 56.6	10.077
23	19 02 03.33	2.5022	-27 47 25.7	+4.063	23	20 53 28.72	2.1342	-21 51 49.2	+10.168
Saturday, November 14.					Monday, November 16.				
00	19 04 33.26	2.4954	-27 43 17.0	+4.226	00	20 55 36.54	2.1267	-21 41 36.4	+10.259
01	19 07 02.78	2.4887	27 38 58.6	4.387	01	20 57 43.92	2.1193	21 31 18.1	10.348
02	19 09 31.90	2.4818	27 34 30.6	4.547	02	20 59 50.85	2.1118	21 20 54.6	10.436
03	19 12 00.59	2.4747	27 29 53.0	4.706	03	21 01 57.34	2.1044	21 10 25.8	10.523
04	19 14 28.86	2.4677	27 25 05.9	4.863	04	21 04 03.38	2.0971	20 59 51.8	10.608
05	19 16 56.71	2.4606	27 20 09.5	5.018	05	21 06 08.99	2.0899	20 49 12.8	10.693
06	19 19 24.13	2.4534	27 15 03.8	5.172	06	21 08 14.17	2.0828	20 38 28.7	10.775
07	19 21 51.12	2.4461	27 09 48.9	5.324	07	21 10 18.92	2.0756	20 27 39.8	10.857
08	19 24 17.66	2.4388	27 04 24.9	5.475	08	21 12 23.24	2.0684	20 16 45.9	10.937
09	19 26 43.77	2.4314	26 58 51.9	5.625	09	21 14 27.13	2.0613	20 05 47.4	11.015
10	19 29 09.43	2.4238	26 53 09.9	5.773	10	21 16 30.60	2.0544	19 54 44.1	11.093
11	19 31 34.63	2.4163	26 47 19.1	5.919	11	21 18 33.66	2.0475	19 43 36.2	11.169
12	19 33 59.38	2.4088	26 41 19.6	6.064	12	21 20 36.30	2.0406	19 32 23.8	11.244
13	19 36 23.68	2.4011	26 35 11.4	6.208	13	21 22 38.53	2.0338	19 21 06.9	11.318
14	19 38 47.51	2.3933	26 28 54.7	6.350	14	21 24 40.36	2.0271	19 09 45.6	11.391
15	19 41 10.88	2.3857	26 22 29.4	6.490	15	21 26 41.78	2.0204	18 58 20.0	11.462
16	19 43 33.79	2.3779	26 15 55.9	6.628	16	21 28 42.81	2.0138	18 46 50.2	11.532
17	19 45 56.23	2.3701	26 09 14.0	6.766	17	21 30 43.43	2.0072	18 35 16.2	11.601
18	19 48 18.20	2.3623	26 02 24.0	6.901	18	21 32 43.67	2.0008	18 23 38.1	11.668
19	19 50 39.70	2.3544	25 55 25.9	7.036	19	21 34 43.52	1.9943	18 11 56.0	11.735
20	19 53 00.73	2.3466	25 48 19.7	7.168	20	21 36 42.99	1.9880	18 00 09.9	11.801
21	19 55 21.29	2.3387	25 41 05.7	7.298	21	21 38 42.08	1.9818	17 48 19.9	11.865
22	19 57 41.37	2.3308	25 33 43.9	7.428	22	21 40 40.80	1.9755	17 36 26.1	11.928
23	20 00 00.98	2.3228	25 26 14.3	7.557	23	21 42 39.14	1.9693	17 24 28.5	11.991
24	20 02 20.10	2.3148	-25 18 37.1	+7.683	24	21 44 37.12	1.9633	-17 12 27.2	+12.052

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Tuesday, November 17.					Thursday, November 19.				
00	21 44 37.12	1.9633	-17 12 27.2	+12.052	00	23 13 19.34	1.7630	-6 42 09.9	+13.879
01	21 46 34.74	1.9573	17 00 22.3	12.112	01	23 15 05.05	1.7608	6 28 16.6	13.808
02	21 48 32.00	1.9513	16 48 13.8	12.171	02	23 16 50.63	1.7587	6 14 22.2	13.915
03	21 50 28.90	1.9455	16 36 01.8	12.228	03	23 18 36.09	1.7566	6 00 26.8	13.932
04	21 52 25.46	1.9398	16 23 46.4	12.284	04	23 20 21.42	1.7546	5 46 30.4	13.948
05	21 54 21.68	1.9341	16 11 27.7	12.340	05	23 22 06.64	1.7527	5 32 33.0	13.964
06	21 56 17.55	1.9284	15 59 05.6	12.395	06	23 23 51.74	1.7508	5 18 34.7	13.978
07	21 58 13.09	1.9229	15 46 40.3	12.449	07	23 25 36.74	1.7491	5 04 35.6	13.993
08	22 00 08.30	1.9175	15 34 11.7	12.502	08	23 27 21.63	1.7474	4 50 35.6	14.007
09	22 02 03.19	1.9121	15 21 40.1	12.553	09	23 29 06.43	1.7458	4 36 34.8	14.019
10	22 03 57.75	1.9067	15 09 05.4	12.603	10	23 30 51.13	1.7443	4 22 33.3	14.032
11	22 05 51.99	1.9014	14 56 27.7	12.653	11	23 32 35.74	1.7428	4 08 31.0	14.043
12	22 07 45.92	1.8963	14 43 47.0	12.702	12	23 34 20.27	1.7415	3 54 28.1	14.053
13	22 09 39.54	1.8913	14 31 03.4	12.749	13	23 36 04.72	1.7402	3 40 24.6	14.064
14	22 11 32.87	1.8863	14 18 17.1	12.796	14	23 37 49.09	1.7390	3 26 20.4	14.073
15	22 13 25.89	1.8813	14 05 27.9	12.843	15	23 39 33.40	1.7379	3 12 15.8	14.082
16	22 15 18.62	1.8764	13 52 36.0	12.887	16	23 41 17.64	1.7368	2 58 10.6	14.091
17	22 17 11.06	1.8717	13 39 41.5	12.931	17	23 43 01.82	1.7358	2 44 04.9	14.098
18	22 19 03.22	1.8669	13 26 44.3	12.974	18	23 44 45.94	1.7349	2 29 58.8	14.104
19	22 20 55.09	1.8623	13 13 44.6	13.016	19	23 46 30.01	1.7342	2 15 52.4	14.111
20	22 22 46.70	1.8578	13 00 42.4	13.058	20	23 48 14.04	1.7334	2 01 45.5	14.117
21	22 24 38.03	1.8533	12 47 37.7	13.098	21	23 49 58.02	1.7327	1 47 38.4	14.121
22	22 26 29.10	1.8489	12 34 30.7	13.137	22	23 51 41.96	1.7322	1 33 31.0	14.125
23	22 28 19.90	1.8446	-12 21 21.3	+13.176	23	23 53 25.88	1.7317	-1 19 23.4	+14.128
Wednesday, November 18.					Friday, November 20.				
00	22 30 10.45	1.8404	-12 08.09.6	+13.213	00	23 55 09.76	1.7312	-1 05 15.6	+14.132
01	22 32 00.75	1.8363	11 54 55.7	13.250	01	23 56 53.62	1.7309	0 51 07.6	14.133
02	22 33 50.80	1.8322	11 41 39.6	13.286	02	23 58 37.47	1.7306	0 36 59.6	14.135
03	22 35 40.61	1.8282	11 28 21.4	13.322	03	00 00 21.29	1.7303	0 22 51.4	14.137
04	22 37 30.18	1.8243	11 15 01.0	13.356	04	00 02 05.11	1.7303	-0 08 43.2	14.136
05	22 39 19.52	1.8205	11 01 38.7	13.389	05	00 03 48.92	1.7303	+0 05 24.9	14.136
06	22 41 08.64	1.8168	10 48 14.3	13.422	06	00 05 32.74	1.7303	0 19 33.1	14.135
07	22 42 57.53	1.8130	10 34 48.0	13.453	07	00 07 16.55	1.7303	0 33 41.1	14.133
08	22 44 46.20	1.8094	10 21 19.9	13.485	08	00 09 00.38	1.7305	0 47 49.0	14.130
09	22 46 34.66	1.8060	10 07 49.8	13.516	09	00 10 44.21	1.7308	1 01 56.7	14.127
10	22 48 22.92	1.8026	9 54 18.0	13.544	10	00 12 28.07	1.7312	1 16 04.2	14.123
11	22 50 10.97	1.7992	9 40 44.5	13.573	11	00 14 11.95	1.7315	1 30 11.4	14.118
12	22 51 58.82	1.7959	9 27 09.2	13.602	12	00 15 55.85	1.7320	1 44 18.4	14.113
13	22 53 46.48	1.7928	9 13 32.3	13.629	13	00 17 39.79	1.7326	1 58 25.0	14.108
14	22 55 33.95	1.7897	8 59 53.7	13.655	14	00 19 23.76	1.7332	2 12 31.3	14.102
15	22 57 21.24	1.7867	8 46 13.7	13.680	15	00 21 07.77	1.7338	2 26 37.2	14.094
16	22 59 08.35	1.7837	8 32 32.1	13.706	16	00 22 51.82	1.7346	2 40 42.6	14.086
17	23 00 55.28	1.7808	8 18 49.0	13.730	17	00 24 35.92	1.7355	2 54 47.5	14.077
18	23 02 42.04	1.7780	8 05 04.5	13.753	18	00 26 20.08	1.7365	3 08 51.8	14.068
19	23 04 28.64	1.7753	7 51 18.6	13.776	19	00 28 04.30	1.7374	3 22 55.6	14.058
20	23 06 15.08	1.7728	7 37 31.4	13.798	20	00 29 48.57	1.7385	3 36 58.8	14.048
21	23 08 01.37	1.7702	7 23 42.8	13.819	21	00 31 32.92	1.7397	3 51 01.3	14.036
22	23 09 47.50	1.7677	7 09 53.1	13.839	22	00 33 17.33	1.7409	4 05 03.1	14.024
23	23 11 33.49	1.7653	6 56 02.1	13.860	23	00 35 01.83	1.7423	4 19 04.2	14.012
24	23 13 19.34	1.7630	-6 42 09.9	+13.879	24	00 36 46.40	1.7436	+4 33 04.5	+13.998

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Saturday, November 21.					Monday, November 23.				
00	h m s	s	° ' "	"	00	h m s	s	° ' "	"
00	00 36 46.40	1.7436	+ 4 33 04.5	+13.998	01	02 03 23.92	1.8918	+15 15 01.0	+12.430
01	00 38 31.06	1.7451	4 47 04.0	13.984	02	02 05 17.57	1.8966	15 27 25.2	12.376
02	00 40 15.81	1.7465	5 01 02.6	13.968	03	02 07 11.51	1.9013	15 39 46.1	12.321
03	00 42 00.64	1.7481	5 15 00.2	13.953	04	02 09 05.73	1.9060	15 52 03.7	12.264
04	00 43 45.58	1.7498	5 28 57.0	13.938	05	02 11 00.23	1.9108	16 04 17.8	12.207
05	00 45 30.62	1.7516	5 42 52.7	13.920	06	02 12 55.03	1.9158	16 16 28.5	12.148
06	00 47 15.77	1.7533	5 56 47.4	13.903	07	02 14 50.13	1.9208	16 28 35.6	12.088
07	00 49 01.02	1.7553	6 10 41.0	13.883	08	02 16 45.52	1.9257	16 40 39.1	12.028
08	00 50 46.40	1.7573	6 24 33.4	13.864	09	02 18 41.21	1.9308	16 52 39.0	11.968
09	00 52 31.89	1.7592	6 38 24.7	13.845	10	02 20 37.21	1.9359	17 04 35.2	11.904
10	00 54 17.50	1.7613	6 52 14.8	13.824	11	02 22 33.52	1.9411	17 16 27.5	11.841
11	00 56 03.24	1.7635	7 06 03.6	13.803	12	02 24 30.14	1.9463	17 28 16.1	11.777
12	00 57 49.12	1.7658	7 19 51.1	13.781	13	02 26 27.07	1.9514	17 40 00.7	11.710
13	00 59 35.13	1.7681	7 33 37.3	13.758	14	02 28 24.31	1.9568	17 51 41.3	11.643
14	01 01 21.29	1.7705	7 47 22.0	13.733	15	02 30 21.88	1.9622	18 03 17.9	11.576
15	01 03 07.59	1.7729	8 01 05.3	13.709	16	02 32 19.77	1.9675	18 14 50.4	11.508
16	01 04 54.04	1.7754	8 14 47.1	13.684	17	02 34 17.98	1.9729	18 26 18.8	11.438
17	01 06 40.64	1.7780	8 28 27.4	13.658	18	02 36 16.52	1.9784	18 37 42.9	11.365
18	01 08 27.40	1.7808	8 42 06.0	13.631	19	02 38 15.39	1.9839	18 49 02.6	11.293
19	01 10 14.33	1.7835	8 55 43.1	13.603	20	02 40 14.59	1.9895	19 00 18.0	11.220
20	01 12 01.42	1.7863	9 09 18.4	13.574	21	02 42 14.13	1.9951	19 11 29.0	11.146
21	01 13 48.68	1.7891	9 22 52.0	13.546	22	02 44 14.00	2.0007	19 22 35.5	11.070
22	01 15 36.11	1.7920	9 36 23.9	13.516	23	02 46 14.21	2.0063	19 33 37.4	10.993
23	01 17 23.72	1.7951	+ 9 49 53.9	+13.485	24	02 48 14.76	2.0121	+19 44 34.6	+10.915
Sunday, November 22.					Tuesday, November 24.				
00	01 19 11.52	1.7982	+10 03 22.1	+13.453	00	02 50 15.66	2.0178	+19 55 27.2	+10.837
01	01 20 59.50	1.8013	10 16 48.3	13.421	01	02 52 16.90	2.0237	20 06 15.0	10.757
02	01 22 47.68	1.8046	10 30 12.6	13.388	02	02 54 18.50	2.0295	20 16 58.0	10.675
03	01 24 36.05	1.8078	10 43 34.8	13.353	03	02 56 20.44	2.0353	20 27 36.0	10.593
04	01 26 24.62	1.8112	10 56 55.0	13.318	04	02 58 22.73	2.0412	20 38 09.1	10.509
05	01 28 13.39	1.8146	11 10 13.0	13.283	05	03 00 25.38	2.0471	20 48 37.1	10.423
06	01 30 02.37	1.8181	11 23 28.9	13.246	06	03 02 28.38	2.0530	20 58 59.9	10.338
07	01 31 51.56	1.8217	11 36 42.5	13.208	07	03 04 31.74	2.0589	21 09 17.6	10.251
08	01 33 40.97	1.8253	11 49 53.9	13.170	08	03 06 35.45	2.0648	21 19 30.0	10.162
09	01 35 30.59	1.8289	12 03 02.9	13.130	09	03 08 39.52	2.0709	21 29 37.0	10.073
10	01 37 20.44	1.8328	12 16 09.5	13.090	10	03 10 43.96	2.0769	21 39 38.7	9.983
11	01 39 10.52	1.8366	12 29 13.7	13.049	11	03 12 48.75	2.0829	21 49 34.9	9.890
12	01 41 00.83	1.8404	12 42 15.4	13.007	12	03 14 53.91	2.0890	21 59 25.5	9.797
13	01 42 51.37	1.8444	12 55 14.5	12.964	13	03 16 59.43	2.0951	22 09 10.5	9.703
14	01 44 42.16	1.8484	13 08 11.1	12.920	14	03 19 05.32	2.1012	22 18 49.8	9.607
15	01 46 33.18	1.8524	13 21 04.9	12.875	15	03 21 11.57	2.1073	22 28 23.3	9.510
16	01 48 24.45	1.8566	13 33 56.1	12.830	16	03 23 18.19	2.1133	22 37 51.0	9.413
17	01 50 15.97	1.8608	13 46 44.5	12.783	17	03 25 25.17	2.1194	22 47 12.8	9.313
18	01 52 07.74	1.8650	13 59 30.1	12.736	18	03 27 32.52	2.1256	22 56 28.6	9.213
19	01 53 59.77	1.8694	14 12 12.8	12.687	19	03 29 40.24	2.1317	23 05 38.3	9.111
20	01 55 52.07	1.8738	14 24 52.5	12.638	20	03 31 48.32	2.1378	23 14 41.9	9.008
21	01 57 44.62	1.8782	14 37 29.3	12.588	21	03 33 56.77	2.1439	23 23 39.3	8.904
22	01 59 37.45	1.8828	14 50 03.0	12.536	22	03 36 05.59	2.1501	23 32 30.4	8.799
23	02 01 30.55	1.8873	15 02 33.6	12.483	23	03 38 14.78	2.1562	23 41 15.2	8.693
24	02 03 23.92	1.8918	+15 15 01.0	+12.430	24	03 40 24.33	2.1623	+23 49 53.5	+ 8.585

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Wednesday, November 25.					Friday, November 27.				
00	h m s		° ' "	"	00	h m s		° ' "	"
01	03 40 24.33	2.1623	+23 49 53.5	+8.585	01	05 30 34.78	2.4043	+28 16 10.1	+2.113
02	03 42 34.25	2.1684	23 58 25.4	8.477	02	05 32 59.13	2.4073	28 18 12.2	1.956
03	03 44 44.54	2.1745	24 06 50.7	8.366	03	05 35 23.66	2.4103	28 20 04.8	1.798
04	03 46 55.19	2.1805	24 15 09.3	8.255	04	05 37 48.36	2.4131	28 21 48.0	1.640
05	03 49 06.20	2.1866	24 23 21.3	8.143	05	05 40 13.23	2.4158	28 23 21.6	1.481
06	03 51 17.58	2.1927	24 31 26.4	8.028	06	05 42 38.26	2.4184	28 24 45.7	1.322
07	03 53 29.32	2.1987	24 39 24.7	7.914	07	05 45 03.44	2.4208	28 26 00.2	1.161
08	03 55 41.42	2.2047	24 47 16.1	7.798	08	05 47 28.76	2.4232	28 27 05.0	1.001
09	03 57 53.88	2.2106	24 55 00.5	7.681	09	05 49 54.23	2.4255	28 28 00.3	0.840
10	04 00 06.69	2.2166	25 02 37.8	7.563	10	05 52 19.82	2.4276	28 28 45.8	0.678
11	04 02 19.87	2.2226	25 10 08.0	7.443	11	05 54 45.54	2.4296	28 29 21.7	0.517
12	04 04 33.40	2.2284	25 17 30.9	7.322	12	05 57 11.37	2.4315	28 29 47.8	0.354
13	04 06 47.28	2.2343	25 24 46.6	7.200	13	05 59 37.32	2.4333	28 30 04.2	0.192
14	04 09 01.51	2.2402	25 31 54.9	7.078	14	06 02 03.37	2.4349	28 30 10.8	+0.029
15	04 11 16.10	2.2460	25 38 55.9	6.953	15	06 04 29.51	2.4363	28 30 07.7	-0.134
16	04 13 31.03	2.2517	25 45 49.3	6.827	16	06 06 55.73	2.4378	28 29 54.7	0.298
17	04 15 46.30	2.2573	25 52 35.1	6.700	17	06 09 22.04	2.4391	28 29 31.9	0.462
18	04 18 01.91	2.2631	25 59 13.3	6.573	18	06 11 48.42	2.4402	28 28 50.3	0.626
19	04 20 17.87	2.2688	26 05 43.9	6.444	19	06 14 14.86	2.4412	28 28 16.8	0.790
20	04 22 34.16	2.2743	26 12 06.6	6.313	20	06 16 41.36	2.4421	28 27 24.5	0.954
21	04 24 50.78	2.2798	26 18 21.5	6.183	21	06 19 07.91	2.4428	28 26 22.3	1.118
22	04 27 07.73	2.2853	26 24 28.6	6.051	22	06 21 34.50	2.4434	28 25 10.3	1.283
23	04 29 25.01	2.2907	26 30 27.6	5.918	23	06 24 01.12	2.4439	28 23 48.3	1.448
24	04 31 42.61	2.2960	+26 36 18.7	+5.783	24	06 26 27.77	2.4443	+28 22 16.5	-1.613
Thursday, November 26.					Saturday, November 28.				
00	04 34 00.53	2.3013	+26 42 01.6	+5.648	00	06 28 54.44	2.4446	+28 20 34.7	-1.778
01	04 36 18.77	2.3066	26 47 36.4	5.512	01	06 31 21.12	2.4447	28 18 43.1	1.943
02	04 38 37.32	2.3118	26 53 03.0	5.374	02	06 33 47.80	2.4447	28 16 41.6	2.108
03	04 40 56.18	2.3168	26 58 21.3	5.235	03	06 36 14.48	2.4446	28 14 30.1	2.273
04	04 43 15.34	2.3218	27 03 31.2	5.095	04	06 38 41.15	2.4443	28 12 08.8	2.438
05	04 45 34.80	2.3268	27 08 32.7	4.954	05	06 41 07.80	2.4440	28 09 37.6	2.603
06	04 47 54.56	2.3317	27 13 25.7	4.813	06	06 43 34.43	2.4435	28 06 56.5	2.767
07	04 50 14.60	2.3364	27 18 10.3	4.671	07	06 46 01.02	2.4428	28 04 05.6	2.931
08	04 52 34.93	2.3412	27 22 46.2	4.527	08	06 48 27.57	2.4422	28 01 04.8	3.096
09	04 54 55.55	2.3458	27 27 13.5	4.383	09	06 50 54.08	2.4413	27 57 54.1	3.259
10	04 57 16.43	2.3503	27 31 32.1	4.238	10	06 53 20.53	2.4403	27 54 33.7	3.423
11	04 59 37.59	2.3549	27 35 42.0	4.091	11	06 55 46.92	2.4393	27 51 03.3	3.588
12	05 01 59.02	2.3593	27 39 43.0	3.943	12	06 58 13.24	2.4381	27 47 23.2	3.750
13	05 04 20.71	2.3636	27 43 35.2	3.796	13	07 00 39.49	2.4368	27 43 33.3	3.913
14	05 06 42.65	2.3678	27 47 18.5	3.647	14	07 03 05.65	2.4353	27 39 33.6	4.077
15	05 09 04.84	2.3719	27 50 52.8	3.497	15	07 05 31.73	2.4338	27 35 24.1	4.238
16	05 11 27.28	2.3759	27 54 18.1	3.347	16	07 07 57.71	2.4322	27 31 05.0	4.400
17	05 13 49.95	2.3798	27 57 34.4	3.195	17	07 10 23.59	2.4304	27 26 36.1	4.563
18	05 16 12.85	2.3836	28 00 41.5	3.042	18	07 12 49.36	2.4286	27 21 57.5	4.723
19	05 18 35.98	2.3873	28 03 39.4	2.889	19	07 15 15.02	2.4267	27 17 09.3	4.884
20	05 20 59.33	2.3908	28 06 28.2	2.736	20	07 17 40.56	2.4246	27 12 11.4	5.044
21	05 23 22.88	2.3943	28 09 07.7	2.581	21	07 20 05.97	2.4225	27 07 04.0	5.203
22	05 25 46.65	2.3978	28 11 37.9	2.425	22	07 22 31.26	2.4203	27 01 47.0	5.363
23	05 28 10.62	2.4011	28 13 58.7	2.268	23	07 24 56.40	2.4178	26 56 20.4	5.523
24	05 30 34.78	2.4043	+28 16 10.1	+2.113	24	07 27 21.40	2.4154	+26 50 44.3	-5.680

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Sunday, November 29.					Tuesday, December 1.				
00	07 27 21.40	2.4154	+26 50 44.3	-5.680	00	09 19 15.79	2.2344	+19 31 09.5	-12.259
01	07 29 46.25	2.4129	26 44 58.8	5.838	01	09 21 29.73	2.2303	19 18 50.6	12.370
02	07 32 10.95	2.4103	26 39 03.8	5.995	02	09 23 43.42	2.2262	19 06 25.1	12.480
03	07 34 35.48	2.4075	26 32 59.4	6.151	03	09 25 56.87	2.2221	18 53 53.0	12.588
04	07 36 59.85	2.4048	26 26 45.7	6.307	04	09 28 10.07	2.2181	18 41 14.5	12.695
05	07 39 24.05	2.4019	26 20 22.6	6.462	05	09 30 23.04	2.2141	18 28 29.6	12.801
06	07 41 48.08	2.3989	26 13 50.3	6.615	06	09 32 35.76	2.2101	18 15 38.4	12.906
07	07 44 11.92	2.3958	26 07 08.8	6.769	07	09 34 48.25	2.2063	18 02 40.9	13.010
08	07 46 35.58	2.3928	26 00 18.0	6.922	08	09 37 00.51	2.2023	17 49 37.2	13.113
09	07 48 59.05	2.3896	25 53 18.2	7.073	09	09 39 12.53	2.1984	17 36 27.4	13.213
10	07 51 22.33	2.3863	25 46 09.2	7.225	10	09 41 24.32	2.1946	17 23 11.6	13.313
11	07 53 45.41	2.3830	25 38 51.2	7.376	11	09 43 35.88	2.1908	17 09 49.8	13.413
12	07 56 08.29	2.3796	25 31 24.1	7.526	12	09 45 47.22	2.1872	16 56 22.1	13.510
13	07 58 30.96	2.3762	25 23 48.1	7.674	13	09 47 58.34	2.1834	16 42 48.6	13.606
14	08 00 53.43	2.3727	25 16 03.2	7.822	14	09 50 09.23	2.1798	16 29 09.4	13.700
15	08 03 15.68	2.3690	25 08 09.4	7.969	15	09 52 19.91	2.1762	16 15 24.6	13.794
16	08 05 37.71	2.3654	25 00 06.9	8.116	16	09 54 30.37	2.1726	16 01 34.1	13.887
17	08 07 59.53	2.3617	24 51 55.5	8.262	17	09 56 40.62	2.1692	15 47 38.2	13.978
18	08 10 21.12	2.3579	24 43 35.5	8.405	18	09 58 50.67	2.1658	15 33 36.8	14.068
19	08 12 42.48	2.3542	24 35 06.9	8.549	19	10 01 00.51	2.1623	15 19 30.1	14.156
20	08 15 03.62	2.3504	24 26 29.6	8.692	20	10 03 10.14	2.1589	15 05 18.1	14.243
21	08 17 24.53	2.3465	24 17 43.8	8.833	21	10 05 19.58	2.1557	14 51 00.9	14.329
22	08 19 45.20	2.3425	24 08 49.6	8.974	22	10 07 28.83	2.1525	14 36 38.6	14.414
23	08 22 05.63	2.3386	+23 59 46.9	-9.114	23	10 09 37.88	2.1493	+14 22 11.2	-14.498
Monday, November 30.					Wednesday, December 2.				
00	08 24 25.83	2.3347	+23 50 35.9	-9.253	00	10 11 46.74	2.1462	+14 07 38.8	-14.580
01	08 26 45.79	2.3306	23 41 16.6	9.391	01	10 13 55.42	2.1432	13 53 01.6	14.661
02	08 29 05.50	2.3265	23 31 49.0	9.528	02	10 16 03.92	2.1402	13 38 19.5	14.742
03	08 31 24.97	2.3224	23 22 13.3	9.663	03	10 18 12.24	2.1372	13 23 32.6	14.820
04	08 33 44.19	2.3183	23 12 29.4	9.798	04	10 20 20.38	2.1343	13 08 41.1	14.897
05	08 36 03.16	2.3142	23 02 37.5	9.932	05	10 22 28.36	2.1316	12 53 45.0	14.973
06	08 38 21.89	2.3101	22 52 37.6	10.064	06	10 24 36.17	2.1288	12 38 44.4	15.047
07	08 40 40.37	2.3058	22 42 29.8	10.196	07	10 26 43.82	2.1262	12 23 39.4	15.120
08	08 42 58.59	2.3017	22 32 14.1	10.326	08	10 28 51.31	2.1237	12 08 30.0	15.193
09	08 45 16.57	2.2975	22 21 50.7	10.455	09	10 30 58.66	2.1212	11 53 16.3	15.263
10	08 47 34.29	2.2933	22 11 19.5	10.583	10	10 33 05.85	2.1186	11 37 58.4	15.333
11	08 49 51.76	2.2890	22 00 40.7	10.711	11	10 35 12.89	2.1163	11 22 36.4	15.401
12	08 52 08.97	2.2848	21 49 54.2	10.838	12	10 37 19.80	2.1140	11 07 10.3	15.468
13	08 54 25.93	2.2806	21 39 00.2	10.962	13	10 39 26.57	2.1118	10 51 40.2	15.533
14	08 56 42.64	2.2763	21 27 58.8	11.085	14	10 41 33.21	2.1097	10 36 06.3	15.598
15	08 58 59.09	2.2721	21 16 50.0	11.208	15	10 43 39.73	2.1076	10 20 28.5	15.661
16	09 01 15.29	2.2678	21 05 33.9	11.329	16	10 45 46.12	2.1055	10 04 47.0	15.723
17	09 03 31.23	2.2636	20 54 10.5	11.450	17	10 47 52.39	2.1037	9 49 01.8	15.783
18	09 05 46.92	2.2594	20 42 39.9	11.569	18	10 49 58.56	2.1018	9 33 13.1	15.841
19	09 08 02.36	2.2553	20 31 02.2	11.687	19	10 52 04.61	2.1001	9 17 20.9	15.899
20	09 10 17.55	2.2511	20 19 17.5	11.803	20	10 54 10.57	2.0984	9 01 25.2	15.956
21	09 12 32.49	2.2468	20 07 25.8	11.919	21	10 56 16.42	2.0968	8 45 26.2	16.011
22	09 14 47.17	2.2426	19 55 27.2	12.034	22	10 58 22.18	2.0953	8 29 23.9	16.064
23	09 17 01.60	2.2385	19 43 21.7	12.148	23	11 00 27.85	2.0938	8 13 18.5	16.117
24	09 19 15.79	2.2344	+19 31 09.5	-12.259	24	11 02 33.44	2.0925	+7 57 09.9	-16.168

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Thursday, December 3.					Saturday, December 5.				
00	11 02 33.44	2.0925	+ 7 57 09.9	-16.168	00	12 43 08.00	2.1336	- 5 31 11.7	-16.949
01	11 04 38.95	2.0913	7 40 58.3	16.218	01	12 45 16.11	2.1368	5 48 08.0	16.928
02	11 06 44.39	2.0901	7 24 43.8	16.265	02	12 47 24.41	2.1400	6 05 03.0	16.905
03	11 08 49.76	2.0889	7 08 26.5	16.312	03	12 49 32.91	2.1433	6 21 56.6	16.880
04	11 10 55.06	2.0879	6 52 06.3	16.358	04	12 51 41.61	2.1468	6 38 48.6	16.854
05	11 13 00.31	2.0871	6 35 43.5	16.403	05	12 53 50.52	2.1502	6 55 39.1	16.827
06	11 15 05.51	2.0862	6 19 18.0	16.446	06	12 55 59.63	2.1538	7 12 27.8	16.796
07	11 17 10.65	2.0854	6 02 50.0	16.488	07	12 58 08.97	2.1575	7 29 14.6	16.764
08	11 19 15.76	2.0848	5 46 19.5	16.528	08	13 00 18.53	2.1612	7 45 59.5	16.732
09	11 21 20.83	2.0842	5 29 46.7	16.567	09	13 02 28.31	2.1650	8 02 42.4	16.697
10	11 23 25.86	2.0837	5 13 11.5	16.604	10	13 04 38.33	2.1690	8 19 23.1	16.660
11	11 25 30.87	2.0833	4 56 34.2	16.640	11	13 06 48.59	2.1730	8 36 01.6	16.622
12	11 27 35.86	2.0830	4 39 54.7	16.675	12	13 08 59.09	2.1771	8 52 37.7	16.582
13	11 29 40.83	2.0828	4 23 13.2	16.708	13	13 11 09.84	2.1813	9 09 11.4	16.540
14	11 31 45.79	2.0827	4 06 29.7	16.740	14	13 13 20.84	2.1855	9 25 42.5	16.496
15	11 33 50.75	2.0827	3 49 44.4	16.770	15	13 15 32.10	2.1899	9 42 10.9	16.450
16	11 35 55.71	2.0827	3 32 57.3	16.800	16	13 17 43.63	2.1944	9 58 36.5	16.403
17	11 38 00.67	2.0828	3 16 08.4	16.828	17	13 19 55.43	2.1988	10 14 59.3	16.355
18	11 40 05.65	2.0831	2 59 17.9	16.854	18	13 22 07.49	2.2034	10 31 19.1	16.303
19	11 42 10.64	2.0833	2 42 25.9	16.878	19	13 24 19.84	2.2082	10 47 35.7	16.250
20	11 44 15.65	2.0838	2 25 32.5	16.902	20	13 26 32.47	2.2129	11 03 49.1	16.196
21	11 46 20.70	2.0843	2 08 37.7	16.924	21	13 28 45.39	2.2178	11 19 59.2	16.140
22	11 48 25.77	2.0849	1 51 41.6	16.945	22	13 30 58.60	2.2226	11 36 05.9	16.082
23	11 50 30.89	2.0857	+ 1 34 44.3	-16.964	23	13 33 12.10	2.2276	-11 52 09.0	-16.021
Friday, December 4.					Sunday, December 6.				
00	11 52 36.05	2.0864	+ 1 17 45.9	-16.982	00	13 35 25.91	2.2327	-12 08 08.4	-15.959
01	11 54 41.26	2.0873	1 00 46.5	16.998	01	13 37 40.02	2.2378	12 24 04.1	15.895
02	11 56 46.53	2.0883	0 43 46.2	17.013	02	13 39 54.44	2.2430	12 39 55.8	15.829
03	11 58 51.86	2.0893	0 26 45.0	17.026	03	13 42 09.18	2.2483	12 55 43.6	15.762
04	12 00 57.25	2.0905	+ 0 09 43.1	17.037	04	13 44 24.23	2.2536	13 11 27.3	15.693
05	12 03 02.72	2.0918	- 0 07 19.4	17.048	05	13 46 39.61	2.2590	13 27 06.8	15.622
06	12 05 08.27	2.0932	0 24 22.6	17.057	06	13 48 55.31	2.2644	13 42 41.9	15.548
07	12 07 13.90	2.0947	0 41 26.2	17.063	07	13 51 11.34	2.2699	13 58 12.5	15.473
08	12 09 19.63	2.0963	0 58 30.2	17.069	08	13 53 27.70	2.2755	14 13 38.6	15.396
09	12 11 25.45	2.0978	1 15 34.5	17.073	09	13 55 44.40	2.2812	14 29 00.0	15.317
10	12 13 31.37	2.0995	1 32 39.0	17.076	10	13 58 01.44	2.2869	14 44 16.6	15.236
11	12 15 37.39	2.1013	1 49 43.6	17.078	11	14 00 18.83	2.2927	14 59 28.3	15.153
12	12 17 43.53	2.1033	2 06 48.3	17.078	12	14 02 36.56	2.2984	15 14 34.9	15.068
13	12 19 49.79	2.1052	2 23 52.9	17.075	13	14 04 54.64	2.3043	15 29 36.4	14.981
14	12 21 56.16	2.1073	2 40 57.3	17.072	14	14 07 13.08	2.3102	15 44 32.6	14.892
15	12 24 02.67	2.1097	2 58 01.5	17.067	15	14 09 31.87	2.3161	15 59 23.4	14.802
16	12 26 09.32	2.1119	3 15 05.3	17.060	16	14 11 51.01	2.3222	16 14 08.8	14.709
17	12 28 16.10	2.1143	3 32 08.7	17.052	17	14 14 10.53	2.3283	16 28 48.5	14.613
18	12 30 23.03	2.1168	3 49 11.5	17.042	18	14 16 30.40	2.3343	16 43 22.4	14.517
19	12 32 30.12	2.1194	4 06 13.7	17.030	19	14 18 50.64	2.3404	16 57 50.5	14.419
20	12 34 37.36	2.1220	4 23 15.1	17.018	20	14 21 11.25	2.3465	17 12 12.7	14.318
21	12 36 44.76	2.1248	4 40 15.8	17.003	21	14 23 32.22	2.3527	17 26 28.7	14.216
22	12 38 52.33	2.1277	4 57 15.5	16.986	22	14 25 53.57	2.3590	17 40 38.6	14.112
23	12 41 00.08	2.1306	5 14 14.1	16.968	23	14 28 15.30	2.3653	17 54 42.1	14.005
24	12 43 08.00	2.1336	- 5 31 11.7	-16.949	24	14 30 37.40	2.3715	-18 08 39.2	-13.897

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Monday, December 7.					Wednesday, December 9.				
00	14 30 37.40	2.3715	-18 08 39.2	-13.897	00	16 31 23.28	2.6371	-26 35 39.7	-6.595
01	14 32 59.88	2.3778	18 22 29.7	13.787	01	16 34 01.61	2.6404	26 42 09.8	6.407
02	14 35 22.73	2.3841	18 36 13.6	13.674	02	16 36 40.13	2.6435	26 48 28.5	6.218
03	14 37 45.97	2.3904	18 49 50.6	13.560	03	16 39 18.83	2.6464	26 54 36.0	6.029
04	14 40 09.58	2.3968	19 03 20.8	13.444	04	16 41 57.70	2.6493	27 00 32.0	5.839
05	14 42 33.58	2.4032	19 16 43.9	13.326	05	16 44 36.74	2.6519	27 06 16.7	5.648
06	14 44 57.96	2.4095	19 29 59.9	13.206	06	16 47 15.93	2.6543	27 11 49.8	5.457
07	14 47 22.72	2.4158	19 43 08.6	13.083	07	16 49 55.26	2.6567	27 17 11.5	5.265
08	14 49 47.86	2.4223	19 56 09.9	12.960	08	16 52 34.73	2.6588	27 22 21.6	5.072
09	14 52 13.39	2.4287	20 09 03.8	12.834	09	16 55 14.32	2.6608	27 27 20.1	4.878
10	14 54 39.30	2.4350	20 21 50.0	12.706	10	16 57 54.03	2.6627	27 32 07.0	4.685
11	14 57 05.59	2.4413	20 34 28.5	12.577	11	17 00 33.84	2.6643	27 36 42.3	4.490
12	14 59 32.26	2.4477	20 46 59.2	12.445	12	17 03 13.74	2.6658	27 41 05.8	4.294
13	15 01 59.31	2.4540	20 59 21.9	12.312	13	17 05 53.73	2.6670	27 45 17.6	4.099
14	15 04 26.74	2.4603	21 11 36.6	12.177	14	17 08 33.78	2.6681	27 49 17.7	3.903
15	15 06 54.55	2.4667	21 23 43.1	12.039	15	17 11 13.90	2.6690	27 53 06.0	3.707
16	15 09 22.74	2.4730	21 35 41.3	11.900	16	17 13 54.06	2.6697	27 56 42.5	3.510
17	15 11 51.31	2.4792	21 47 31.1	11.759	17	17 16 34.26	2.6702	28 00 07.2	3.313
18	15 14 20.25	2.4853	21 59 12.4	11.617	18	17 19 14.48	2.6705	28 03 20.1	3.118
19	15 16 49.55	2.4915	22 10 45.1	11.472	19	17 21 54.72	2.6707	28 06 21.3	2.921
20	15 19 19.23	2.4977	22 22 09.0	11.326	20	17 24 34.97	2.6707	28 09 10.6	2.723
21	15 21 49.27	2.5038	22 33 24.2	11.178	21	17 27 15.20	2.6704	28 11 48.1	2.527
22	15 24 19.68	2.5098	22 44 30.4	11.028	22	17 29 55.42	2.6701	28 14 13.8	2.329
23	15 26 50.44	2.5158	-22 55 27.6	-10.877	23	17 32 35.61	2.6695	-28 16 27.6	-2.132
Tuesday, December 8.					Thursday, December 10.				
00	15 29 21.57	2.5218	-23 06 15.6	-10.723	00	17 35 15.76	2.6688	-28 18 29.6	-1.935
01	15 31 53.05	2.5276	23 16 54.4	10.568	01	17 37 55.86	2.6678	28 20 19.8	1.738
02	15 34 24.88	2.5334	23 27 23.8	10.412	02	17 40 35.89	2.6666	28 21 58.2	1.542
03	15 36 57.06	2.5392	23 37 43.8	10.253	03	17 43 15.85	2.6652	28 23 24.8	1.345
04	15 39 29.58	2.5448	23 47 54.2	10.093	04	17 45 55.71	2.6636	28 24 39.6	1.148
05	15 42 02.44	2.5504	23 57 54.9	9.932	05	17 48 35.48	2.6619	28 25 42.6	0.953
06	15 44 35.63	2.5558	24 07 46.0	9.769	06	17 51 15.14	2.6600	28 26 34.0	0.758
07	15 47 09.14	2.5613	24 17 27.2	9.603	07	17 53 54.68	2.6578	28 27 13.6	0.563
08	15 49 42.98	2.5667	24 26 58.4	9.438	08	17 56 34.08	2.6556	28 27 41.5	0.369
09	15 52 17.14	2.5719	24 36 19.7	9.271	09	17 59 13.35	2.6532	28 27 57.9	-0.176
10	15 54 51.61	2.5770	24 45 30.9	9.101	10	18 01 52.46	2.6504	28 28 02.6	+0.018
11	15 57 26.38	2.5821	24 54 31.8	8.930	11	18 04 31.40	2.6476	28 27 55.7	0.212
12	15 00 01.46	2.5871	25 03 22.5	8.758	12	18 07 10.17	2.6446	28 27 37.2	0.404
13	16 02 36.83	2.5919	25 12 02.8	8.585	13	18 09 48.75	2.6413	28 27 07.2	0.595
14	16 05 12.49	2.5967	25 20 32.7	8.410	14	18 12 27.13	2.6379	28 26 25.8	0.786
15	16 07 48.43	2.6013	25 28 52.0	8.233	15	18 15 05.30	2.6343	28 25 32.9	0.976
16	16 10 24.64	2.6058	25 37 00.7	8.056	16	18 17 43.25	2.6306	28 24 28.7	1.165
17	16 13 01.12	2.6102	25 44 58.7	7.877	17	18 20 20.97	2.6267	28 23 13.1	1.353
18	16 15 37.86	2.6144	25 52 45.9	7.697	18	18 22 58.45	2.6227	28 21 46.3	1.540
19	16 18 14.85	2.6185	26 00 22.3	7.517	19	18 25 35.69	2.6184	28 20 08.3	1.727
20	16 20 52.08	2.6225	26 07 47.9	7.334	20	18 28 12.66	2.6140	28 18 19.1	1.913
21	16 23 29.55	2.6263	26 15 02.4	7.151	21	18 30 49.37	2.6095	28 16 18.8	2.097
22	16 26 07.24	2.6301	26 22 06.0	6.967	22	18 33 25.80	2.6048	28 14 07.5	2.281
23	16 28 45.16	2.6337	26 28 58.4	6.781	23	18 36 01.94	2.5998	28 11 45.1	2.463
24	16 31 23.28	2.6371	-26 35 39.7	-6.595	24	18 38 37.78	2.5948	-28 09 11.9	+2.644

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Friday, December 11.					Sunday, December 13.				
00	18 38 37.78	2.5948	-28 09 11.9	+2.644	00	20 35 19.75	2.2437	-23 00 02.3	+9.633
01	18 41 13.31	2.5896	28 06 27.8	2.824	01	20 37 34.13	2.2356	22 50 21.1	9.739
02	18 43 48.53	2.5843	28 03 33.0	3.003	02	20 39 48.02	2.2274	22 40 33.6	9.843
03	18 46 23.43	2.5788	28 00 27.4	3.182	03	20 42 01.42	2.2193	22 30 39.9	9.946
04	18 48 57.99	2.5732	27 57 11.2	3.358	04	20 44 14.34	2.2113	22 20 40.1	10.048
05	18 51 32.21	2.5674	27 53 44.5	3.533	05	20 46 26.77	2.2033	22 10 34.2	10.148
06	18 54 06.08	2.5615	27 50 07.3	3.707	06	20 48 38.73	2.1953	22 00 22.4	10.245
07	18 56 39.59	2.5556	27 46 19.7	3.880	07	20 50 50.21	2.1873	21 50 04.8	10.342
08	18 59 12.75	2.5495	27 42 21.7	4.051	08	20 53 01.21	2.1793	21 39 41.4	10.437
09	19 01 45.53	2.5432	27 38 13.6	4.221	09	20 55 11.73	2.1714	21 29 12.4	10.530
10	19 04 17.93	2.5368	27 33 55.2	4.390	10	20 57 21.78	2.1636	21 18 37.8	10.623
11	19 06 49.94	2.5303	27 29 26.8	4.557	11	20 59 31.36	2.1558	21 07 57.7	10.713
12	19 09 21.56	2.5237	27 24 48.4	4.723	12	21 01 40.47	2.1480	20 57 12.3	10.801
13	19 11 52.78	2.5170	27 20 00.1	4.887	13	21 03 49.12	2.1403	20 46 21.6	10.889
14	19 14 23.60	2.5102	27 15 02.0	5.050	14	21 05 57.30	2.1325	20 35 25.6	10.975
15	19 16 54.00	2.5032	27 09 54.1	5.212	15	21 08 05.02	2.1249	20 24 24.6	11.058
16	19 19 23.98	2.4962	27 04 36.6	5.371	16	21 10 12.29	2.1173	20 13 18.6	11.142
17	19 21 53.54	2.4892	26 59 09.6	5.529	17	21 12 19.10	2.1098	20 02 07.6	11.223
18	19 24 22.68	2.4820	26 53 33.1	5.687	18	21 14 25.46	2.1023	19 50 51.8	11.303
19	19 26 51.38	2.4747	26 47 47.2	5.842	19	21 16 31.37	2.0948	19 39 31.2	11.382
20	19 29 19.64	2.4673	26 41 52.1	5.995	20	21 18 36.84	2.0874	19 28 05.9	11.459
21	19 31 47.46	2.4599	26 35 47.8	6.148	21	21 20 41.86	2.0801	19 16 36.1	11.535
22	19 34 14.83	2.4524	26 29 34.4	6.298	22	21 22 46.45	2.0729	19 05 01.7	11.610
23	19 36 41.75	2.4448	-26 23 12.1	+6.447	23	21 24 50.61	2.0657	-18 53 22.9	+11.683
Saturday, December 12.					Monday, December 14.				
00	19 39 08.21	2.4372	-26 16 40.8	+6.594	00	21 26 54.33	2.0585	-18 41 39.7	+11.755
01	19 41 34.21	2.4295	26 10 00.8	6.740	01	21 28 57.63	2.0514	18 29 52.3	11.825
02	19 43 59.75	2.4218	26 03 12.0	6.884	02	21 31 00.56	2.0444	18 18 00.7	11.894
03	19 46 24.82	2.4138	25 56 14.7	7.026	03	21 33 02.90	2.0375	18 06 05.0	11.962
04	19 48 49.41	2.4060	25 49 08.9	7.167	04	21 35 05.00	2.0306	17 54 05.2	12.028
05	19 51 13.54	2.3982	25 41 54.7	7.306	05	21 37 06.63	2.0238	17 42 01.6	12.093
06	19 53 37.19	2.3902	25 34 32.2	7.443	06	21 39 07.85	2.0171	17 29 54.0	12.158
07	19 56 00.36	2.3822	25 27 01.5	7.579	07	21 41 08.68	2.0104	17 17 42.7	12.220
08	19 58 23.05	2.3742	25 19 22.7	7.713	08	21 43 09.10	2.0037	17 05 27.6	12.282
09	20 00 45.26	2.3662	25 11 35.9	7.846	09	21 45 09.12	1.9972	16 53 08.9	12.342
10	20 03 06.99	2.3581	25 03 41.2	7.977	10	21 47 08.76	1.9908	16 40 46.6	12.401
11	20 05 28.23	2.3499	24 55 38.7	8.106	11	21 49 08.01	1.9843	16 28 20.8	12.458
12	20 07 48.98	2.3418	24 47 28.5	8.233	12	21 51 06.88	1.9780	16 15 51.6	12.515
13	20 10 09.24	2.3337	24 39 10.7	8.359	13	21 53 05.37	1.9718	16 03 19.0	12.570
14	20 12 29.02	2.3255	24 30 45.4	8.483	14	21 55 03.49	1.9656	15 50 43.2	12.624
15	20 14 48.30	2.3173	24 22 12.8	8.605	15	21 57 01.24	1.9595	15 38 04.1	12.678
16	20 17 07.09	2.3091	24 13 32.8	8.726	16	21 58 58.63	1.9535	15 25 21.0	12.729
17	20 19 25.39	2.3009	24 04 45.7	8.845	17	22 00 55.66	1.9475	15 12 36.6	12.780
18	20 21 43.20	2.2928	23 55 51.4	8.963	18	22 02 52.33	1.9417	14 59 48.3	12.829
19	20 24 00.52	2.2846	23 46 50.1	9.078	19	22 04 48.66	1.9359	14 46 57.1	12.878
20	20 26 17.35	2.2764	23 37 42.0	9.193	20	22 06 44.64	1.9302	14 34 03.0	12.925
21	20 28 33.69	2.2682	23 28 27.0	9.306	21	22 08 40.28	1.9245	14 21 06.1	12.972
22	20 30 49.53	2.2600	23 19 05.3	9.416	22	22 10 35.58	1.9189	14 08 06.4	13.017
23	20 33 04.89	2.2518	23 09 37.1	9.525	23	22 12 30.55	1.9135	13 55 04.1	13.061
24	20 35 19.75	2.2437	-23 00 02.3	+9.633	24	22 14 25.20	1.9082	-13 41 59.1	+13.104

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Tuesday, December 15.					Thursday, December 17.				
00	22 14 25.20	1.9082	-13 41 59.1	+13.104	00	23 41 22.11	1.7468	-2 40 36.5	+14.145
01	22 16 19.53	1.9028	13 28 51.6	13.146	01	23 43 06.88	1.7455	2 26 27.7	14.148
02	22 18 13.54	1.8975	13 15 41.6	13.188	02	23 44 51.57	1.7442	2 12 18.7	14.151
03	22 20 07.23	1.8924	13 02 29.1	13.228	03	23 46 36.18	1.7431	1 58 09.6	14.153
04	22 22 00.63	1.8874	12 49 14.3	13.267	04	23 48 20.74	1.7420	1 44 00.4	14.154
05	22 23 53.72	1.8823	12 35 57.1	13.305	05	23 50 05.22	1.7410	1 29 51.1	14.155
06	22 25 46.51	1.8774	12 22 37.7	13.342	06	23 51 49.66	1.7402	1 15 41.8	14.154
07	22 27 39.01	1.8727	12 09 16.1	13.378	07	23 53 34.04	1.7393	1 01 32.6	14.154
08	22 29 31.23	1.8679	11 55 52.4	13.413	08	23 55 18.37	1.7385	0 47 23.3	14.153
09	22 31 23.16	1.8633	11 42 26.5	13.448	09	23 57 02.66	1.7378	0 33 14.2	14.152
10	22 33 14.82	1.8587	11 28 58.7	13.481	10	23 58 46.91	1.7373	0 19 05.1	14.149
11	22 35 06.20	1.8542	11 15 28.8	13.513	11	00 00 31.14	1.7368	-0 04 56.3	14.146
12	22 36 57.32	1.8498	11 01 57.1	13.544	12	00 02 15.33	1.7363	+0 09 12.4	14.143
13	22 38 48.18	1.8454	10 48 23.5	13.575	13	00 03 59.50	1.7360	0 23 20.8	14.138
14	22 40 38.77	1.8412	10 34 48.1	13.605	14	00 05 43.65	1.7358	0 37 29.0	14.133
15	22 42 29.12	1.8371	10 21 10.9	13.634	15	00 07 27.79	1.7356	0 51 36.8	14.128
16	22 44 19.22	1.8330	10 07 32.0	13.662	16	00 09 11.92	1.7355	1 05 44.3	14.121
17	22 46 09.08	1.8290	9 53 51.5	13.688	17	00 10 56.05	1.7354	1 19 51.3	14.114
18	22 47 58.70	1.8251	9 40 09.4	13.715	18	00 12 40.17	1.7355	1 33 58.0	14.107
19	22 49 48.09	1.8213	9 26 25.7	13.741	19	00 14 24.31	1.7357	1 48 04.2	14.098
20	22 51 37.25	1.8175	9 12 40.5	13.765	20	00 16 08.45	1.7358	2 02 09.8	14.090
21	22 53 26.19	1.8139	8 58 53.9	13.789	21	00 17 52.61	1.7362	2 16 15.0	14.081
22	22 55 14.92	1.8103	8 45 05.8	13.812	22	00 19 36.79	1.7366	2 30 19.5	14.070
23	22 57 03.43	1.8068	-8 31 16.5	+13.833	23	00 21 21.00	1.7370	+2 44 23.4	+14.060
Wednesday, December 16.					Friday, December 18.				
00	22 58 51.73	1.8033	-8 17 25.8	+13.855	00	00 23 05.23	1.7375	+2 58 26.7	+14.049
01	23 00 39.83	1.8001	8 03 33.9	13.876	01	00 24 49.50	1.7382	3 12 29.3	14.037
02	23 02 27.74	1.7969	7 49 40.7	13.896	02	00 26 33.81	1.7388	3 26 31.1	14.024
03	23 04 15.46	1.7938	7 35 46.4	13.914	03	00 28 18.16	1.7397	3 40 32.2	14.012
04	23 06 02.99	1.7907	7 21 51.0	13.933	04	00 30 02.57	1.7406	3 54 32.5	13.998
05	23 07 50.34	1.7877	7 07 54.5	13.950	05	00 31 47.03	1.7414	4 08 31.9	13.983
06	23 09 37.51	1.7848	6 53 57.0	13.967	06	00 33 31.54	1.7424	4 22 30.4	13.967
07	23 11 24.51	1.7819	6 39 58.5	13.983	07	00 35 16.12	1.7436	4 36 27.9	13.951
08	23 13 11.34	1.7792	6 25 59.0	13.998	08	00 37 00.77	1.7448	4 50 24.5	13.935
09	23 14 58.01	1.7766	6 11 58.7	14.012	09	00 38 45.49	1.7460	5 04 20.1	13.918
10	23 16 44.53	1.7740	5 57 57.6	14.026	10	00 40 30.29	1.7473	5 18 14.7	13.901
11	23 18 30.89	1.7715	5 43 55.6	14.039	11	00 42 15.17	1.7487	5 32 08.2	13.882
12	23 20 17.11	1.7692	5 29 52.9	14.051	12	00 44 00.13	1.7502	5 46 00.5	13.863
13	23 22 03.19	1.7668	5 15 49.5	14.063	13	00 45 45.19	1.7518	5 59 51.7	13.843
14	23 23 49.12	1.7645	5 01 45.3	14.074	14	00 47 30.34	1.7534	6 13 41.7	13.823
15	23 25 34.93	1.7624	4 47 40.6	14.083	15	00 49 15.60	1.7552	6 27 30.4	13.801
16	23 27 20.61	1.7603	4 33 35.3	14.093	16	00 51 00.96	1.7569	6 41 17.8	13.780
17	23 29 06.17	1.7584	4 19 29.4	14.102	17	00 52 46.43	1.7588	6 55 04.0	13.758
18	23 30 51.62	1.7565	4 05 23.1	14.110	18	00 54 32.01	1.7608	7 08 48.7	13.734
19	23 32 36.95	1.7547	3 51 16.2	14.118	19	00 56 17.72	1.7628	7 22 32.1	13.711
20	23 34 22.18	1.7529	3 37 09.0	14.124	20	00 58 03.55	1.7649	7 36 14.0	13.686
21	23 36 07.30	1.7513	3 23 01.3	14.131	21	00 59 49.51	1.7671	7 49 54.4	13.661
22	23 37 52.33	1.7497	3 08 53.3	14.135	22	01 01 35.60	1.7694	8 03 33.3	13.635
23	23 39 37.26	1.7482	2 54 45.1	14.140	23	01 03 21.84	1.7718	8 17 10.6	13.608
24	23 41 22.11	1.7468	-2 40 36.5	+14.145	24	01 05 08.21	1.7741	+8 30 46.3	+13.581

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Hour.	Right Ascension.	Var. per Minute.	Declination.
Saturday, December 19.					Monday, December 21.							
00	01 05 08.21	1.7741	+ 8 30 46.3	+13.581	00	02 34 27.71	1.9738	+18 36 14.0	00	02 34 27.71	1.9738	+18 36 14.0
01	01 06 54.73	1.7766	8 44 20.3	13.553	01	02 36 26.31	1.9795	18 47 31.4	01	02 36 26.31	1.9795	18 47 31.4
02	01 08 41.40	1.7792	8 57 52.7	13.525	02	02 38 25.25	1.9853	18 58 43.5	02	02 38 25.25	1.9853	18 58 43.5
03	01 10 28.23	1.7818	9 11 23.3	13.495	03	02 40 24.54	1.9911	19 09 51.4	03	02 40 24.54	1.9911	19 09 51.4
04	01 12 15.22	1.7846	9 24 52.1	13.465	04	02 42 24.18	1.9969	19 20 54.8	04	02 42 24.18	1.9969	19 20 54.8
05	01 14 02.38	1.7874	9 38 19.1	13.434	05	02 44 24.17	2.0028	19 31 53.8	05	02 44 24.17	2.0028	19 31 53.8
06	01 15 49.71	1.7903	9 51 44.2	13.403	06	02 46 24.51	2.0088	19 42 48.3	06	02 46 24.51	2.0088	19 42 48.3
07	01 17 37.21	1.7932	10 05 07.4	13.370	07	02 48 25.22	2.0148	19 53 38.1	07	02 48 25.22	2.0148	19 53 38.1
08	01 19 24.89	1.7962	10 18 28.6	13.337	08	02 50 26.28	2.0207	20 04 23.3	08	02 50 26.28	2.0207	20 04 23.3
09	01 21 12.75	1.7993	10 31 47.8	13.303	09	02 52 27.70	2.0268	20 15 03.7	09	02 52 27.70	2.0268	20 15 03.7
10	01 23 00.80	1.8024	10 45 04.9	13.268	10	02 54 29.49	2.0329	20 25 39.1	10	02 54 29.49	2.0329	20 25 39.1
11	01 24 49.04	1.8057	10 58 19.9	13.233	11	02 56 31.65	2.0391	20 36 10.2	11	02 56 31.65	2.0391	20 36 10.2
12	01 26 37.48	1.8090	11 11 32.8	13.197	12	02 58 34.18	2.0453	20 46 31.0	12	02 58 34.18	2.0453	20 46 31.0
13	01 28 26.12	1.8124	11 24 43.5	13.159	13	03 00 37.08	2.0514	20 56 56.8	13	03 00 37.08	2.0514	20 56 56.8
14	01 30 14.97	1.8158	11 37 51.9	13.122	14	03 02 40.35	2.0577	21 07 12.0	14	03 02 40.35	2.0577	21 07 12.0
15	01 32 04.02	1.8193	11 50 58.1	13.083	15	03 04 44.00	2.0639	21 17 23.2	15	03 04 44.00	2.0639	21 17 23.2
16	01 33 53.29	1.8230	12 04 01.9	13.043	16	03 06 48.02	2.0703	21 27 28.5	16	03 06 48.02	2.0703	21 27 28.5
17	01 35 42.78	1.8267	12 17 03.3	13.003	17	03 08 52.43	2.0767	21 37 28.0	17	03 08 52.43	2.0767	21 37 28.0
18	01 37 32.49	1.8304	12 30 02.2	12.962	18	03 10 57.22	2.0830	21 47 23.3	18	03 10 57.22	2.0830	21 47 23.3
19	01 39 22.43	1.8343	12 42 58.7	12.921	19	03 13 02.39	2.0893	21 57 12.0	19	03 13 02.39	2.0893	21 57 12.0
20	01 41 12.60	1.8382	12 55 52.7	12.878	20	03 15 07.94	2.0958	22 06 51.1	20	03 15 07.94	2.0958	22 06 51.1
21	01 43 03.01	1.8421	13 08 44.0	12.834	21	03 17 13.88	2.1023	22 16 34.5	21	03 17 13.88	2.1023	22 16 34.5
22	01 44 53.65	1.8461	13 21 32.8	12.790	22	03 19 20.21	2.1087	22 26 07.0	22	03 19 20.21	2.1087	22 26 07.0
23	01 46 44.54	1.8503	+13 34 18.8	+12.744	23	03 21 26.92	2.1152	+22 35 33.8	23	03 21 26.92	2.1152	+22 35 33.8
Sunday, December 20.					Tuesday, December 22.							
00	01 48 35.68	1.8544	+13 47 02.1	+12.698	00	03 23 34.03	2.1218	+22 44 54.8	00	03 23 34.03	2.1218	+22 44 54.8
01	01 50 27.07	1.8587	13 59 42.6	12.652	01	03 25 41.53	2.1282	22 54 09.0	01	03 25 41.53	2.1282	22 54 09.0
02	01 52 18.72	1.8629	14 12 20.3	12.603	02	03 27 49.41	2.1347	23 03 19.0	02	03 27 49.41	2.1347	23 03 19.0
03	01 54 10.62	1.8673	14 24 55.0	12.554	03	03 29 57.69	2.1413	23 12 22.1	03	03 29 57.69	2.1413	23 12 22.1
04	01 56 02.79	1.8718	14 37 26.8	12.505	04	03 32 06.37	2.1478	23 21 19.1	04	03 32 06.37	2.1478	23 21 19.1
05	01 57 55.23	1.8763	14 49 55.6	12.454	05	03 34 15.43	2.1543	23 30 09.0	05	03 34 15.43	2.1543	23 30 09.0
06	01 59 47.95	1.8808	15 02 21.3	12.403	06	03 36 24.89	2.1610	23 38 54.5	06	03 36 24.89	2.1610	23 38 54.5
07	02 01 40.93	1.8854	15 14 43.9	12.350	07	03 38 34.75	2.1675	23 47 32.7	07	03 38 34.75	2.1675	23 47 32.7
08	02 03 34.20	1.8902	15 27 03.3	12.297	08	03 40 44.99	2.1740	23 56 04.5	08	03 40 44.99	2.1740	23 56 04.5
09	02 05 27.76	1.8950	15 39 19.5	12.243	09	03 42 55.63	2.1807	24 04 20.8	09	03 42 55.63	2.1807	24 04 20.8
10	02 07 21.60	1.8998	15 51 32.4	12.187	10	03 45 06.67	2.1872	24 12 48.5	10	03 45 06.67	2.1872	24 12 48.5
11	02 09 15.73	1.9047	16 03 41.9	12.131	11	03 47 18.09	2.1937	24 21 00.6	11	03 47 18.09	2.1937	24 21 00.6
12	02 11 10.16	1.9097	16 15 48.1	12.074	12	03 49 29.91	2.2003	24 29 06.0	12	03 49 29.91	2.2003	24 29 06.0
13	02 13 04.89	1.9147	16 27 50.8	12.016	13	03 51 42.12	2.2068	24 37 04.0	13	03 51 42.12	2.2068	24 37 04.0
14	02 14 59.92	1.9198	16 39 50.0	11.957	14	03 53 54.72	2.2133	24 44 56.1	14	03 53 54.72	2.2133	24 44 56.1
15	02 16 55.26	1.9249	16 51 45.6	11.897	15	03 56 07.72	2.2198	24 52 41.1	15	03 56 07.72	2.2198	24 52 41.1
16	02 18 50.91	1.9302	17 03 37.6	11.835	16	03 58 21.10	2.2263	25 00 18.9	16	03 58 21.10	2.2263	25 00 18.9
17	02 20 46.88	1.9354	17 15 25.8	11.773	17	04 00 34.88	2.2328	25 07 49.6	17	04 00 34.88	2.2328	25 07 49.6
18	02 22 43.16	1.9407	17 27 10.3	11.710	18	04 02 49.04	2.2392	25 15 13.1	18	04 02 49.04	2.2392	25 15 13.1
19	02 24 39.76	1.9461	17 38 51.0	11.646	19	04 05 03.58	2.2456	25 22 29.4	19	04 05 03.58	2.2456	25 22 29.4
20	02 26 36.69	1.9515	17 50 27.8	11.580	20	04 07 18.51	2.2519	25 29 38.3	20	04 07 18.51	2.2519	25 29 38.3
21	02 28 33.94	1.9570	18 02 00.6	11.514	21	04 09 33.81	2.2583	25 36 39.8	21	04 09 33.81	2.2583	25 36 39.8
22	02 30 31.53	1.9626	18 13 29.5	11.447	22	04 11 49.50	2.2647	25 43 33.9	22	04 11 49.50	2.2647	25 43 33.9
23	02 32 29.45	1.9682	18 24 54.3	11.378	23	04 14 05.57	2.2709	25 50 20.4	23	04 14 05.57	2.2709	25 50 20.4
24	02 34 27.71	1.9738	+18 36 14.9	+11.309	24	04 16 22.01	2.2772	+25 56 59.3	24	04 16 22.01	2.2772	+25 56 59.3

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Wednesday, December 23.					Friday, December 25.				
00	^h 04 ^m 16 ^s 22.01	2.2772	[°] +25 ['] 56 ["] 59.3	+6.584	00	^h 06 ^m 11 ^s 29.20	2.4804	[°] +28 ['] 05 ["] 07.1	-0.751
01	04 18 38.83	2.2833	26 03 30.5	6.456	01	06 13 58.07	2.4818	28 24 17.0	0.921
02	04 20 56.01	2.2895	26 09 54.0	6.325	02	06 16 27.02	2.4830	28 23 16.6	1.092
03	04 23 13.57	2.2957	26 16 09.5	6.193	03	06 18 56.03	2.4841	28 22 06.0	1.261
04	04 25 31.49	2.3017	26 22 17.2	6.061	04	06 21 25.11	2.4851	28 20 45.3	1.432
05	04 27 49.77	2.3077	26 28 16.8	5.927	05	06 23 54.24	2.4858	28 19 14.2	1.603
06	04 30 08.41	2.3137	26 34 08.4	5.793	06	06 26 23.41	2.4864	28 17 33.0	1.773
07	04 32 27.41	2.3196	26 39 51.9	5.657	07	06 28 52.61	2.4870	28 15 41.5	1.944
08	04 34 46.76	2.3253	26 45 27.2	5.518	08	06 31 21.85	2.4874	28 13 39.7	2.115
09	04 37 06.45	2.3311	26 50 54.1	5.380	09	06 33 51.10	2.4876	28 11 27.7	2.285
10	04 39 26.49	2.3368	26 56 12.8	5.241	10	06 36 20.36	2.4877	28 09 05.5	2.456
11	04 41 46.86	2.3424	27 01 23.0	5.100	11	06 38 49.62	2.4877	28 06 33.0	2.628
12	04 44 07.58	2.3481	27 06 24.8	4.958	12	06 41 18.88	2.4875	28 03 50.2	2.798
13	04 46 28.63	2.3535	27 11 18.0	4.815	13	06 43 48.12	2.4872	28 00 57.2	2.968
14	04 48 50.00	2.3589	27 16 02.6	4.671	14	06 46 17.34	2.4868	27 57 54.0	3.139
15	04 51 11.70	2.3643	27 20 38.5	4.526	15	06 48 46.53	2.4861	27 54 40.5	3.310
16	04 53 33.71	2.3695	27 25 05.7	4.379	16	06 51 15.67	2.4853	27 51 16.8	3.480
17	04 55 56.04	2.3747	27 29 24.0	4.232	17	06 53 44.77	2.4845	27 47 42.9	3.650
18	04 58 18.67	2.3798	27 33 33.5	4.084	18	06 56 13.81	2.4835	27 43 58.8	3.820
19	05 00 41.61	2.3848	27 37 34.1	3.934	19	06 58 42.79	2.4824	27 40 04.5	3.989
20	05 03 04.84	2.3896	27 41 25.6	3.783	20	07 01 11.70	2.4812	27 36 00.1	4.158
21	05 05 28.36	2.3944	27 45 08.1	3.633	21	07 03 40.53	2.4798	27 31 45.5	4.327
22	05 07 52.17	2.3991	27 48 41.5	3.480	22	07 06 09.27	2.4783	27 27 20.9	4.495
23	05 10 16.25	2.4037	+27 52 05.7	+3.327	23	07 08 37.92	2.4766	+27 22 46.1	-4.663
Thursday, December 24.					Saturday, December 26.				
00	05 12 40.61	2.4083	+27 55 20.7	+3.173	00	07 11 06.46	2.4748	+27 18 01.3	-4.831
01	05 15 05.24	2.4126	27 58 26.4	3.018	01	07 13 34.90	2.4729	27 13 06.4	4.998
02	05 17 30.12	2.4168	28 01 22.8	2.861	02	07 16 03.21	2.4709	27 08 01.5	5.164
03	05 19 55.26	2.4211	28 04 09.7	2.703	03	07 18 31.41	2.4688	27 02 46.7	5.330
04	05 22 20.65	2.4252	28 06 47.2	2.546	04	07 20 59.47	2.4665	26 57 21.9	5.497
05	05 24 46.28	2.4291	28 09 15.2	2.388	05	07 23 27.39	2.4642	26 51 47.1	5.661
06	05 27 12.14	2.4329	28 11 33.7	2.228	06	07 25 55.17	2.4618	26 46 02.6	5.824
07	05 29 38.23	2.4367	28 13 42.5	2.068	07	07 28 22.80	2.4593	26 40 08.2	5.988
08	05 32 04.54	2.4403	28 15 41.8	1.907	08	07 30 50.28	2.4565	26 34 04.0	6.152
09	05 34 31.06	2.4437	28 17 31.3	1.745	09	07 33 17.58	2.4537	26 27 50.0	6.314
10	05 36 57.78	2.4471	28 19 11.2	1.583	10	07 35 44.72	2.4508	26 21 26.3	6.475
11	05 39 24.71	2.4503	28 20 41.3	1.419	11	07 38 11.68	2.4478	26 14 53.0	6.636
12	05 41 51.82	2.4534	28 22 01.5	1.255	12	07 40 38.46	2.4448	26 08 10.0	6.797
13	05 44 19.12	2.4564	28 23 11.9	1.092	13	07 43 05.05	2.4415	26 01 17.4	6.956
14	05 46 46.59	2.4593	28 24 12.5	0.927	14	07 45 31.44	2.4382	25 54 15.3	7.113
15	05 49 14.23	2.4620	28 25 03.1	0.760	15	07 47 57.63	2.4348	25 47 03.8	7.271
16	05 51 42.03	2.4646	28 25 43.7	0.594	16	07 50 23.62	2.4314	25 39 42.8	7.428
17	05 54 09.98	2.4671	28 26 14.4	0.428	17	07 52 49.40	2.4279	25 32 12.4	7.584
18	05 56 38.08	2.4694	28 26 35.0	0.260	18	07 55 14.97	2.4243	25 24 32.7	7.738
19	05 59 06.31	2.4715	28 26 45.6	+0.093	19	07 57 40.31	2.4205	25 16 43.8	7.892
20	06 01 34.66	2.4736	28 26 46.1	-0.075	20	08 00 05.43	2.4168	25 08 45.7	8.045
21	06 04 03.14	2.4756	28 26 36.6	0.243	21	08 02 30.32	2.4129	25 00 38.4	8.198
22	06 06 31.73	2.4773	28 26 16.9	0.413	22	08 04 54.98	2.4090	24 52 22.0	8.348
23	06 09 00.42	2.4789	28 25 47.1	0.582	23	08 07 19.40	2.4049	24 43 56.6	8.498
24	06 11 29.20	2.4804	+28 25 07.1	-0.751	24	08 09 43.57	2.4008	+24 35 22.2	-8.648

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Sunday, December 27.					Tuesday, December 29.				
00	^h 08 ^m 09 ^s 43.57	2.4008	+24 35 22.2	-8.648	00	^h 09 ^m 59 ^s 41.01	2.1808	+15 12 11.1	-14.301
01	08 12 07.50	2.3968	24 26 38.9	8.795	01	10 01 51.74	2.1768	14 57 50.5	14.384
02	08 14 31.18	2.3925	24 17 46.8	8.941	02	10 04 02.22	2.1727	14 43 25.0	14.466
03	08 16 54.60	2.3883	24 08 46.0	9.087	03	10 06 12.46	2.1688	14 28 54.6	14.548
04	08 19 17.77	2.3840	23 59 36.4	9.232	04	10 08 22.47	2.1648	14 14 19.3	14.627
05	08 21 40.68	2.3797	23 50 18.2	9.375	05	10 10 32.23	2.1608	13 59 39.4	14.704
06	08 24 03.33	2.3753	23 40 51.4	9.517	06	10 12 41.77	2.1571	13 44 54.8	14.781
07	08 26 25.71	2.3708	23 31 16.2	9.658	07	10 14 51.08	2.1533	13 30 05.7	14.856
08	08 28 47.82	2.3663	23 21 32.5	9.798	08	10 17 00.16	2.1496	13 15 12.1	14.929
09	08 31 09.66	2.3618	23 11 40.5	9.937	09	10 19 09.03	2.1460	13 00 14.2	15.002
10	08 33 31.23	2.3572	23 01 40.1	10.074	10	10 21 17.68	2.1423	12 45 11.9	15.073
11	08 35 52.52	2.3525	22 51 31.6	10.210	11	10 23 26.11	2.1388	12 30 05.5	15.141
12	08 38 13.53	2.3478	22 41 14.9	10.345	12	10 25 34.33	2.1353	12 14 55.0	15.208
13	08 40 34.26	2.3432	22 30 50.2	10.479	13	10 27 42.35	2.1320	11 59 40.5	15.275
14	08 42 54.72	2.3385	22 20 17.4	10.612	14	10 29 50.17	2.1287	11 44 22.0	15.340
15	08 45 14.88	2.3338	22 09 36.8	10.743	15	10 31 57.79	2.1253	11 28 59.7	15.403
16	08 47 34.77	2.3291	21 58 48.3	10.873	16	10 34 05.21	2.1222	11 13 33.6	15.466
17	08 49 54.37	2.3243	21 47 52.1	11.001	17	10 36 12.45	2.1192	10 58 03.8	15.526
18	08 52 13.68	2.3195	21 36 48.2	11.128	18	10 38 19.51	2.1161	10 42 30.5	15.585
19	08 54 32.71	2.3148	21 25 36.8	11.253	19	10 40 26.38	2.1131	10 26 53.6	15.643
20	08 56 51.45	2.3099	21 14 17.8	11.379	20	10 42 33.08	2.1103	10 11 13.3	15.699
21	08 59 09.90	2.3052	21 02 51.3	11.502	21	10 44 39.61	2.1075	9 55 29.7	15.754
22	09 01 28.07	2.3003	20 51 17.6	11.623	22	10 46 45.98	2.1048	9 39 42.8	15.808
23	09 03 45.94	2.2954	+20 39 36.5	-11.745	23	10 48 52.18	2.1020	+ 9 23 52.8	-15.859
Monday, December 28.					Wednesday, December 30.				
00	09 06 03.52	2.2906	+20 27 48.2	-11.864	00	10 50 58.22	2.0994	+ 9 07 59.7	-15.910
01	09 08 20.81	2.2858	20 15 52.8	11.982	01	10 53 04.11	2.0970	8 52 03.6	15.959
02	09 10 37.82	2.2810	20 03 50.4	12.098	02	10 55 09.86	2.0946	8 36 04.6	16.008
03	09 12 54.53	2.2762	19 51 41.1	12.213	03	10 57 15.46	2.0923	8 20 02.7	16.054
04	09 15 10.96	2.2714	19 39 24.9	12.327	04	10 59 20.93	2.0900	8 03 58.1	16.098
05	09 17 27.10	2.2667	19 27 01.9	12.438	05	11 01 26.26	2.0878	7 47 50.9	16.142
06	09 19 42.96	2.2619	19 14 32.3	12.549	06	11 03 31.47	2.0858	7 31 41.1	16.184
07	09 21 58.53	2.2571	19 01 56.0	12.659	07	11 05 36.55	2.0837	7 15 28.8	16.225
08	09 24 13.81	2.2523	18 49 13.2	12.767	08	11 07 41.51	2.0818	6 59 14.1	16.264
09	09 26 28.81	2.2477	18 36 24.0	12.873	09	11 09 46.37	2.0800	6 42 57.1	16.302
10	09 28 43.53	2.2430	18 23 28.4	12.978	10	11 11 51.11	2.0782	6 26 37.9	16.338
11	09 30 57.97	2.2383	18 10 26.6	13.083	11	11 13 55.75	2.0765	6 10 16.5	16.374
12	09 33 12.13	2.2337	17 57 18.5	13.185	12	11 16 00.29	2.0749	5 53 53.0	16.408
13	09 35 26.01	2.2291	17 44 04.4	13.286	13	11 18 04.74	2.0735	5 37 27.6	16.439
14	09 37 39.62	2.2245	17 30 44.2	13.385	14	11 20 09.11	2.0721	5 21 00.3	16.471
15	09 39 52.95	2.2199	17 17 18.2	13.483	15	11 22 13.39	2.0707	5 04 31.1	16.501
16	09 42 06.01	2.2154	17 03 46.2	13.580	16	11 24 17.59	2.0695	4 48 00.2	16.528
17	09 44 18.80	2.2110	16 50 08.6	13.675	17	11 26 21.73	2.0683	4 31 27.7	16.555
18	09 46 31.33	2.2066	16 36 25.2	13.769	18	11 28 25.79	2.0673	4 14 53.6	16.580
19	09 48 43.59	2.2022	16 22 36.3	13.861	19	11 30 29.80	2.0663	3 58 18.1	16.604
20	09 50 55.59	2.1978	16 08 41.9	13.952	20	11 32 33.75	2.0654	3 41 41.1	16.627
21	09 53 07.33	2.1935	15 54 42.1	14.041	21	11 34 37.65	2.0647	3 25 02.9	16.648
22	09 55 18.81	2.1893	15 40 37.0	14.129	22	11 36 41.51	2.0640	3 08 23.4	16.668
23	09 57 30.04	2.1850	15 26 26.6	14.216	23	11 38 45.33	2.0634	2 51 42.7	16.687
24	09 59 41.01	2.1808	+15 12 11.1	-14.301	24	11 40 49.12	2.0629	+ 2 35 01.0	-16.703

MOON, 1931.

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THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.	Hour.	Right Ascension.	Var. per Minute.	Declination.	Var. per Minute.
Thursday, December 31.									
00	11 40 49.12	2.0629	+ 2 35 01.0	-16.703	12	12 05 33.97	2.0640	- 0 46 11.4	-16.797
01	11 42 52.88	2.0624	2 18 18.3	16.718	13	12 07 37.83	2.0647	1 02 59.2	16.796
02	11 44 56.61	2.0621	2 01 34.8	16.733	14	12 09 41.73	2.0655	1 19 46.9	16.793
03	11 47 00.33	2.0619	1 44 50.4	16.746	15	12 11 45.69	2.0664	1 36 34.4	16.789
04	11 49 04.04	2.0618	1 28 05.3	16.757	16	12 13 49.70	2.0673	1 53 21.6	16.783
05	11 51 07.74	2.0617	1 11 19.6	16.767	17	12 15 53.77	2.0684	2 10 08.4	16.777
06	11 53 11.45	2.0617	0 54 33.3	16.776	18	12 17 57.91	2.0696	2 26 54.8	16.768
07	11 55 15.15	2.0618	0 37 46.5	16.783	19	12 20 02.12	2.0708	2 43 40.6	16.758
08	11 57 18.87	2.0622	0 20 59.4	16.788	20	12 22 06.41	2.0723	3 00 25.8	16.748
09	11 59 22.61	2.0625	+ 0 04 11.9	16.793	21	12 24 10.79	2.0737	3 17 10.3	16.735
10	12 01 26.37	2.0628	- 0 12 35.7	16.795	22	12 26 15.25	2.0752	3 33 54.0	16.721
11	12 03 30.15	2.0633	0 29 23.5	16.797	23	12 28 19.81	2.0768	3 50 36.8	16.705
12	12 05 33.97	2.0640	- 0 46 11.4	-16.797	24	12 30 24.47	2.0786	- 4 07 18.6	-16.688

PHASES OF THE MOON.

○ Full Moon...	Jan.	d h m 4 13 14.9	April	d h m 2 20 05.5	June	d h m 30 00 46.9	Sept.	d h m 26 19 44.9
☾ Last Quarter		11 05 09.2		9 20 15.2	July	7 23 51.6	Oct.	4 20 15.1
● New Moon...		18 18 35.6		18 00 59.7		15 12 20.0		11 13 05.9
☽ First Quarter		27 00 05.5		25 13 40.1		22 05 16.1		18 09 20.0
○ Full Moon...	Feb.	3 00 25.9	May	2 05 14.4		29 12 47.5		26 13 33.9
☾ Last Quarter		9 16 09.6		9 12 48.2	Aug.	6 16 27.8	Nov.	3 07 17.5
● New Moon...		17 13 10.8		17 15 27.9		13 20 27.0		9 22 55.4
☽ First Quarter		25 16 41.9		24 19 38.8		20 11 36.3		17 02 13.4
○ Full Moon...	Mar.	4 10 36.1		31 14 33.0		28 03 09.5		25 07 09.9
☾ Last Quarter		11 05 15.2	June	8 06 18.2	Sept.	5 07 21.2	Dec.	2 16 50.5
● New Moon...		19 07 50.6		16 03 01.7		12 04 26.4		9 10 16.0
☽ First Quarter		27 05 04.2		23 00 23.2		18 20 37.3		16 22 42.9
○ Full Moon...	April	2 20 05.5		30 00 46.9		26 19 44.9		24 23 23.5
☾ Last Quarter		9 20 15.2	July	7 23 51.6	Oct.	4 20 15.1		32 01 23.1

PERIGEE.

APOGEE.

January ...	d h 6 14.8	July ...	d h 18 12.4	January ...	d h 22 13.3	August ...	d h 3 07.8
February ...	3 22.4	August ...	15 09.9	February ...	18 21.7	August ...	30 21.4
March ...	4 10.7	September ...	12 17.4	March ...	17 22.8	September ...	27 02.7
April ...	1 22.1	October ...	11 04.5	April ...	14 08.6	October ...	24 04.9
April ...	30 03.5	November ...	8 15.0	May ...	12 01.3	November ...	20 16.8
May ...	27 16.3	December ...	6 18.1	June ...	8 19.9	December ...	18 11.7
June ...	22 01.0			July ...	6 14.5		

AT TRANSIT AT GREENWICH.

Date.	Illuminated Limbs and Transit.	Apparent Right Ascension of Limb.	Var. per Hour of Long.	Sidereal Time of S. D. passing Meridian	Apparent Geocentric Declination of Centre.	Var. per Hour of Long.	Geocentric Semi-diameter.	Equatorial Horizontal Parallax.
Jan. 0	I L	^h 02 ^m 46 ^s 17.78	^s 130.79	^s 67.43	+18° 20' 47.2"	+ 746.8	15° 26' 28"	56° 39' 58"
0	S I U	03 13 05.14	137.20	69.08	20 44 15.3	685.3	15 33.46	57 05.91
1	I L	03 41 12.42	144.07	70.81	22 53 49.5	607.5	15 40.82	57 32.94
1	S I U	04 10 43.29	151.07	72.54	24 46 04.2	511.9	15 48.21	58 00.09
2	I L	04 41 36.94	157.78	74.16	26 17 21.8	397.9	15 55.47	58 26.73
2	N I U	05 13 46.71	163.66	75.56	+27 24 05.1	+ 266.4	16 02.41	58 52.19
3	I L	05 46 59.41	168.17	76.61	28 02 57.7	+ 120.1	16 08.84	59 15.81
3	N I U	06 20 55.61	170.84	77.22	28 11 26.5	- 36.6	16 14.60	59 36.92
4	I L	06 57 46.09	171.39	77.34	27 48 02.5	197.6	16 19.50	59 54.93
5	N I U	07 31 55.20	169.78	76.97	26 52 35.7	355.9	16 23.43	60 09.35
5	I L	08 05 33.80	166.38	76.18	+25 26 17.9	- 505.0	16 26.29	60 19.84
6	S I U	08 38 23.00	161.65	75.07	23 31 32.9	639.6	16 28.02	60 26.20
6	I L	09 10 10.29	156.16	73.76	21 11 39.7	755.9	16 28.63	60 28.41
7	S I U	09 40 49.85	150.45	72.38	18 30 30.8	852.1	16 28.14	60 26.62
7	I L	10 10 21.74	144.95	71.02	15 32 11.7	927.6	16 26.63	60 21.07
8	S I U	10 38 50.61	139.98	69.79	+12 20 46.7	- 983.3	16 24.20	60 12.17
8	I L	11 06 24.26	135.77	68.71	9 00 07.4	1020.3	16 20.98	60 00.35
9	S I U	11 33 12.55	132.43	67.86	5 33 48.5	1040.2	16 17.10	59 46.13
9	I L	11 59 26.32	130.02	67.24	+ 2 05 05.7	1044.5	16 12.71	59 30.00
10	S I U	12 25 16.81	128.55	66.86	- 1 23 03.4	1034.8	16 07.94	59 12.47
10	I L	12 50 55.16	127.99	66.71	- 4 47 56.6	-1012.1	16 02.91	58 53.98
11	S I U	13 16 32.11	128.30	66.79	8 07 04.1	977.3	15 57.71	58 34.94
11	I L	13 42 17.66	129.41	67.08	11 18 04.8	931.0	15 52.47	58 15.70
12	S I U	14 08 20.78	131.22	67.55	14 18 44.1	873.7	15 47.24	57 56.52
12	I L	14 34 49.10	133.59	68.16	17 06 51.2	805.7	15 42.10	57 37.63
13	S I U	15 01 48.46	136.36	68.86	-19 40 17.8	- 727.0	15 37.07	57 19.19
13	I L	15 29 22.47	139.32	69.60	21 56 59.8	638.3	15 32.20	57 01.30
14	S I U	15 57 32.02	142.24	70.31	23 54 58.9	540.0	15 27.50	56 44.04
14	I L	16 26 14.88	144.83	70.94	25 32 27.1	433.3	15 22.98	56 27.45
15	I U	16 55 25.49	146.82	71.41	26 47 52.0	319.8	15 18.64	56 11.54
15	I L	17 24 55.18	147.97	71.67	-27 40 04.0	- 201.6	15 14.49	55 56.32
16	I U	17 54 32.69	148.10	71.67	28 08 22.2	- 81.3	15 10.54	55 41.80
16	I L	18 24 05.25	147.13	71.41	28 12 38.8	+ 38.2	15 06.78	55 27.98
17	I U	18 53 19.70	145.10	70.87	27 53 20.1	154.1	15 03.21	55 14.90
17	I L	19 22 03.99	142.14	70.11	27 11 25.7	263.8	14 59.86	55 02.59
18	I U	19 47 49.82	138.62	69.15	-26 08 21.9	+ 365.3	14 56.72	54 51.09
19	I L	20 15 08.76	134.48	68.07	24 45 56.0	457.3	14 53.84	54 40.50
19	I U	20 41 36.39	130.11	66.93	23 06 08.0	538.9	14 51.22	54 30.89
20	I L	21 07 11.42	125.75	65.77	21 11 03.2	610.1	14 48.91	54 22.40
20	I U	21 31 55.16	121.59	64.66	19 02 46.1	671.1	14 46.93	54 15.15
21	I L	21 55 51.00	117.79	63.65	-16 43 16.1	+ 722.4	14 45.34	54 09.29
21	I U	22 19 03.98	114.46	62.75	14 14 25.5	764.7	14 44.17	54 04.98
22	I L	22 41 40.31	111.69	62.00	11 37 57.2	798.8	14 43.45	54 02.37
22	S I U	23 03 47.03	109.53	61.42	- 8 55 25.4	+ 825.4	14 43.25	54 01.64

Jan. 2 U Defective Illumination of S σ° .60.Jan. 6 U Defective Illumination of N σ° .24.

AT TRANSIT AT GREENWICH.

Date.	Illum- inated Limbs and Transit.	Apparent Right Ascension of Limb.	Var. per Hour of Long.	Sidereal Time of S. D. passing Meridian	Apparent Geocentric Declination of Centre.	Var. per Hour of Long.	Geocentric Semi- diameter.	Equa- torial Hori- zontal Parallax.
Jan. 23	I L	^h 23 ^m 25 ^s 31.71	^s 108.03	^s 61.02	— 6° 08' 16.5	+ 845.1	14° 43' 60	54° 02' 93
23	S I U	23 47 02.42	107.21	60.83	3 17 49.9	858.4	14 44.55	54 06.39
24	I L	00 08 27.54	107.10	60.83	— 0 25 20.5	865.5	14 46.12	54 12.18
24	S I U	00 29 55.74	107.73	61.05	+ 2 27 58.7	866.7	14 48.36	54 20.39
25	I L	00 51 36.02	109.12	61.49	5 20 54.9	861.7	14 51.28	54 31.13
25	S I U	01 13 37.66	111.29	62.14	+ 8 12 11.5	+ 850.0	14 54.91	54 44.45
26	I L	01 36 10.22	114.27	63.02	11 00 25.5	831.1	14 59.26	55 00.40
26	S I U	01 59 23.51	118.08	64.10	13 44 04.0	803.9	15 04.31	55 18.93
27	I L	02 23 27.37	122.70	65.39	16 21 20.6	767.2	15 10.05	55 39.99
27	S I U	02 48 31.42	128.10	66.85	18 50 11.1	719.3	15 16.43	56 03.42
28	I L	03 14 44.52	134.19	68.46	+21 08 12.3	+ 658.6	15 23.41	56 29.03
28	S I U	03 42 14.00	140.80	70.17	23 12 39.3	583.3	15 30.89	56 56.50
29	I L	04 11 04.65	147.67	71.89	25 00 26.9	491.8	15 38.78	57 25.46
29	S I U	04 41 17.49	154.42	73.55	26 28 14.4	383.2	15 46.94	57 55.40
30	I L	05 12 48.44	160.60	75.03	27 32 35.3	257.5	15 55.20	58 25.72
30	N I U	05 45 27.48	165.68	76.21	+28 10 13.9	+ 116.5	16 03.38	58 55.74
31	I L	06 18 58.48	169.18	77.01	28 18 23.8	— 36.5	16 11.26	59 24.68
31	N I U	06 53 00.37	170.78	77.34	27 55 10.3	196.4	16 18.63	59 51.73
Feb. 1	I L	07 27 09.33	170.37	77.21	26 59 47.9	356.9	16 25.26	60 16.04
1	N I U	08 01 01.91	168.10	76.63	25 32 49.8	511.2	16 30.92	60 36.83
2	I L	08 34 17.99	164.37	75.72	+23 36 06.4	— 653.5	16 35.44	60 53.41
3	N II U	09 09 12.03	159.46	74.58	21 12 33.7	778.8	16 38.65	61 05.22
3	II L	09 40 34.76	154.30	73.32	18 25 55.6	884.0	16 40.48	61 11.92
4	S II U	10 10 55.40	149.18	72.06	15 20 25.0	967.4	16 40.87	61 13.34
4	II L	10 40 16.67	144.46	70.88	12 00 25.7	1028.8	16 39.84	61 09.57
5	S II U	11 08 44.95	140.38	69.86	+ 8 30 18.6	— 1068.8	16 37.47	61 00.86
5	II L	11 36 28.94	137.10	69.04	4 54 13.8	1088.7	16 33.87	60 47.66
6	S II U	12 03 38.75	134.69	68.43	+ 1 16 03.5	1090.0	16 29.21	60 30.57
6	II L	12 30 25.05	133.18	68.06	— 2 20 39.3	1074.4	16 23.67	60 10.24
7	S II U	12 56 58.49	132.54	67.92	5 52 41.2	1043.5	16 17.45	59 47.38
7	II L	13 23 29.27	132.72	67.99	— 9 17 07.2	— 998.6	16 10.73	59 22.72
8	S II U	13 50 06.72	133.64	68.25	12 31 17.5	941.1	16 03.70	58 56.92
8	II L	14 16 59.07	135.18	68.68	15 32 46.6	871.9	15 56.54	58 30.63
9	S II U	14 44 12.90	137.19	69.21	18 19 20.2	792.0	15 49.39	58 04.39
9	II L	15 11 52.82	139.50	69.82	20 48 55.2	702.2	15 42.38	57 38.66
10	S II U	15 40 01.10	141.88	70.43	—22 59 38.6	— 603.6	15 35.61	57 13.81
10	II L	16 08 37.22	144.10	70.99	24 49 50.5	497.2	15 29.16	56 50.14
11	S II U	16 37 37.73	145.90	71.43	26 18 06.8	384.6	15 23.09	56 27.86
11	II L	17 06 56.24	147.05	71.70	27 23 22.4	267.5	15 17.44	56 07.11
12	N II U	17 36 23.77	147.38	71.75	28 04 56.6	148.1	15 12.23	55 47.99
12	II L	18 05 49.60	146.76	71.56	—28 22 36.6	— 28.8	15 07.47	55 30.52
13	II U	18 35 02.18	145.17	71.13	28 16 38.3	+ 87.9	15 03.16	55 14.70
13	II L	19 03 50.24	142.70	70.46	27 47 46.6	199.7	14 59.29	55 00.49
14	II U	19 32 03.94	139.48	69.60	—26 57 11.9	+ 304.8	14 55.84	54 47.86

Jan. 30 U Defective Illumination of S 0°-77.
Feb. 3 U Defective Illumination of I 0°-02.

Feb. 4 U Defective Illumination of N 0°-84.

MOON 1931.

AT TRANSIT AT GREENWICH.

Date.		Illum- inated Limbs and Transit.	Appar- ent Right Ascension of Limb.	Var. per Hour of Long.	Sidereal Time of S. D. passing Meridian	Apparent Geocentric Declination of Centre.	Var. per Hour of Long.	Geocentric Semi- diameter.	Equa- torial Hori- zontal Parallax.
Feb. 14		II L	^h 19 ^m 59 ^s 35.57	^s 135.72	^s 68.59	[°] -25 ['] 46 ["] 25.6	["] + 401.5	['] 14 52.81	['] 54 36.73
15		II U	20 26 20.03	131.65	67.49	24 17 13.6	488.9	14 50.17	54 27.05
15		II L	20 52 14.85	127.49	66.36	22 31 30.7	566.6	14 47.91	54 18.74
16		II U	21 17 20.04	123.42	65.23	20 31 14.7	634.4	14 46.02	54 11.79
16		II L	21 41 37.78	119.60	64.18	18 18 22.9	692.6	14 44.48	54 06.14
17		I U	22 03 05.43	116.31	63.21	-15 54 48.2	+ 741.7	14 43.29	54 01.78
18		I L	22 26 02.61	113.31	62.37	13 22 18.3	782.0	14 42.46	53 58.74
18		I U	22 48 26.94	110.84	61.69	10 42 34.2	814.1	14 42.00	53 57.04
19		I L	23 10 25.09	108.95	61.16	7 57 10.5	838.6	14 41.92	53 56.74
19		I U	23 32 04.17	107.67	60.82	5 07 36.0	855.9	14 42.23	53 57.90
20		I L	23 53 31.61	107.02	60.66	- 2 15 15.3	+ 866.4	14 42.97	54 00.62
20		I U	00 14 55.21	107.03	60.70	+ 0 38 31.0	870.2	14 44.17	54 05.00
21		I L	00 36 22.92	107.71	60.94	3 32 23.2	867.4	14 45.84	54 11.13
21		I U	00 58 03.01	109.09	61.38	6 25 01.4	857.9	14 48.02	54 19.14
22		I L	01 20 03.92	111.18	62.03	9 15 03.5	841.3	14 50.75	54 29.15
22	S	I U	01 42 34.23	114.00	62.87	+12 01 01.9	+ 817.1	14 54.04	54 41.24
23		I L	02 05 42.74	117.54	63.91	14 41 21.5	784.7	14 57.92	54 55.50
23	S	I U	02 29 38.11	121.80	65.13	17 14 17.3	743.0	15 02.42	55 11.99
24		I L	02 54 28.69	126.73	66.50	19 37 50.8	690.8	15 07.53	55 30.74
24	S	I U	03 20 22.01	132.24	68.00	21 49 49.5	626.9	15 13.25	55 51.74
25		I L	03 47 24.22	138.18	69.57	+23 47 45.0	+ 550.1	15 19.56	56 14.91
25	S	I U	04 15 39.16	144.32	71.16	25 28 54.7	459.1	15 26.43	56 40.11
26		I L	04 45 07.50	150.36	72.69	26 50 25.0	353.4	15 33.78	57 07.12
26	S	I U	05 15 45.74	155.90	74.05	27 49 19.0	233.2	15 41.55	57 35.61
27		I L	05 47 25.61	160.55	75.16	28 22 48.6	+ 99.7	15 49.60	58 05.18
27	N	I U	06 19 53.94	163.92	75.95	+28 28 28.3	- 44.6	15 57.81	58 35.30
28		I L	06 52 53.61	165.73	76.35	28 04 30.9	195.7	16 05.99	59 05.31
28	N	I U	07 26 05.11	165.89	76.34	27 10 03.2	348.8	16 13.93	59 34.49
Mar. 1		I L	07 59 08.96	164.49	75.96	25 45 13.3	498.5	16 21.44	60 02.02
1	N	I U	08 31 47.89	161.81	75.28	23 51 14.2	639.5	16 28.26	60 27.07
2		I L	09 03 48.77	158.23	74.37	+21 30 17.6	- 767.3	16 34.19	60 48.82
2	N	I U	09 35 03.46	154.18	73.34	18 45 24.8	878.4	16 38.99	61 06.46
3		I L	10 05 28.87	150.08	72.30	15 40 12.9	970.2	16 42.50	61 19.35
3	N	I U	10 35 06.36	146.25	71.33	12 18 42.9	1041.2	16 44.59	61 26.99
4		II L	11 06 21.79	142.81	70.49	8 45 08.3	1091.0	16 45.15	61 29.07
5	S	II U	11 34 39.19	140.22	69.83	+ 5 03 44.8	-1119.4	16 44.19	61 25.53
5		II L	12 02 30.19	138.42	69.37	+ 1 18 44.1	1127.3	16 41.74	61 16.53
6	S	II U	12 30 04.45	137.43	69.13	- 2 25 51.8	1115.5	16 37.90	61 02.45
6		II L	12 57 31.78	137.25	69.10	6 06 14.0	1085.2	16 32.82	60 43.81
7	S	II U	13 25 01.52	137.82	69.28	9 38 49.2	1037.9	16 26.69	60 21.32
7		II L	13 52 42.08	139.04	69.62	-13 00 20.4	- 974.8	16 19.73	59 55.76
8	S	II U	14 20 40.50	140.77	70.10	16 07 48.4	897.6	16 12.15	59 27.93
8		II L	14 49 01.94	142.84	70.67	18 58 31.4	807.6	16 04.17	58 58.66
9	S	II U	15 17 49.25	145.04	71.26	-21 30 06.7	- 706.6	15 56.01	58 28.68

Mar. 3 U Defective Illumination of II 0°.23.

Mar. 5 U Defective Illumination of N 0°.75.

MOON, 1931.

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AT TRANSIT AT GREENWICH.

Date.	Illuminated Limbs and Transit.	Apparent Right Ascension of Limb.	Var. per Hour of Long.	Sidereal Time of S. D. passing Meridian	Apparent Geocentric Declination of Centre.	Var. per Hour of Long.	Geocentric Semi-diameter.	Equatorial Horizontal Parallax.
Mar. 9	II L	15 47 02.48	147.12	71.82	23 40 31.7	-596.2	15 47.84	57 58.71
10	S II U	16 16 38.65	148.82	72.27	25 28 06.9	478.6	15 39.84	57 29.34
10	II L	16 46 31.81	149.91	72.55	26 51 38.5	356.0	15 32.14	57 01.08
11	S II U	17 16 33.33	150.19	72.63	27 50 21.1	230.9	15 24.85	56 34.33
11	II L	17 46 32.56	149.52	72.47	28 24 00.9	-106.0	15 18.06	56 09.42
12	N II U	18 16 17.92	147.88	72.05	-28 32 55.0	+16.3	15 11.83	55 46.55
12	II L	18 45 38.03	145.33	71.39	28 17 50.6	133.4	15 06.20	55 25.89
13	N II U	19 14 22.78	142.02	70.52	27 40 00.3	243.6	15 01.19	55 07.49
13	II L	19 42 24.22	138.15	69.48	26 40 57.1	345.4	14 56.81	54 51.39
14	N II U	20 09 36.97	133.94	68.35	25 22 27.5	437.9	14 53.04	54 37.55
14	II L	20 35 58.35	129.62	67.16	-23 46 25.7	+520.8	14 49.86	54 25.90
15	II U	21 01 28.17	125.38	65.98	21 54 48.3	593.9	14 47.26	54 16.36
15	II L	21 26 08.44	121.38	64.85	19 49 30.5	657.6	14 45.21	54 08.83
16	II U	21 50 02.83	117.75	63.81	17 32 23.1	712.2	14 43.67	54 03.17
16	II L	22 13 16.32	114.58	62.88	15 05 11.4	758.3	14 42.61	53 59.28
17	II U	22 35 54.77	111.93	62.10	-12 29 35.7	+796.4	14 42.00	53 57.05
17	II L	22 58 04.75	109.83	61.48	9 47 09.7	826.7	14 41.82	53 56.37
18	II U	23 19 53.14	108.33	61.03	6 59 23.6	849.8	14 42.03	53 57.17
18	II L	23 41 27.18	107.44	60.76	4 07 43.6	865.8	14 42.63	53 59.35
19	I U	00 00 52.91	107.17	60.67	-1 13 33.7	874.8	14 43.59	54 02.89
20	I L	00 22 20.37	107.51	60.78	+1 41 42.2	+876.8	14 44.91	54 07.74
20	I U	00 43 55.75	108.49	61.09	4 36 39.7	871.7	14 46.59	54 13.89
21	I L	01 05 46.81	110.13	61.58	7 29 52.1	859.2	14 48.62	54 21.35
21	I U	01 28 01.46	112.42	62.27	10 19 48.2	838.9	14 51.02	54 30.16
22	I L	01 50 47.56	115.37	63.13	13 04 51.2	810.2	14 53.80	54 40.35
22	I U	02 14 12.90	118.96	64.18	+15 43 16.6	+772.5	14 56.97	54 51.98
23	I L	02 38 24.91	123.14	65.37	18 13 11.0	724.9	15 00.54	55 05.11
23	S I U	03 03 30.36	127.85	66.69	20 32 31.0	666.6	15 04.54	55 19.80
24	I L	03 29 34.90	132.97	68.09	22 39 02.2	596.6	15 08.98	55 36.09
24	S I U	03 56 42.47	138.32	69.53	24 30 20.8	514.3	15 13.87	55 54.01
25	I L	04 24 54.54	143.67	70.95	+26 03 55.7	+419.3	15 19.20	56 13.57
25	S I U	04 54 09.49	148.74	72.26	27 17 13.2	311.5	15 24.96	56 34.73
26	I L	05 24 21.96	153.20	73.39	28 07 45.1	191.9	15 31.14	56 57.39
26	S I U	05 55 22.66	156.73	74.27	28 33 17.7	+62.0	15 37.67	57 21.40
27	I L	06 26 58.87	159.08	74.84	28 32 02.9	-75.5	15 44.51	57 46.50
27	N I U	06 58 55.25	160.08	75.07	+28 02 49.3	-217.1	15 51.57	58 12.40
28	I L	07 30 55.57	159.75	74.98	27 05 09.0	359.1	15 58.73	58 38.67
28	N I U	08 02 44.44	158.21	74.57	25 39 22.9	497.5	16 05.85	59 04.80
29	I L	08 34 08.92	155.74	73.93	23 46 38.9	628.2	16 12.77	59 30.21
29	N I U	09 04 59.72	152.66	73.14	21 28 48.2	748.1	16 10.32	59 54.25
30	I L	09 35 11.72	149.33	72.27	+18 48 18.1	-854.4	16 25.30	60 16.21
30	N I U	10 04 43.87	146.07	71.41	15 48 04.3	945.1	16 30.52	60 35.38
31	I L	10 33 38.63	143.14	70.64	12 31 24.4	1018.6	16 34.80	60 51.08
31	N I U	11 02 01.31	140.75	70.00	+9 01 51.1	-1073.8	16 37.96	61 02.67

MOON, 1931.

AT TRANSIT AT GREENWICH.

Date.	Illuminated Limbs and Transit.	Apparent Right Ascension of Limb.	Var. per Hour of Long.	Sidereal Time of S. D. passing Meridian	Apparent Geocentric Declination of Centre.	Var. per Hour of Long.	Geocentric Semi-diameter.	Equatorial Horizontal Parallax.
Apr. 1	I L	^h 11 ^m 29 ^s 59.28	^s 139.04	^s 69.54	[°] + 5 23 08.0	["] -1110.1	['] 16 39.87	["] 61 09.67
1	N I U	11 57 41.27	138.69	69.28	+ 1 39 05.7	1127.0	16 40.42	61 11.70
2	I L	12 25 16.65	137.94	69.24	- 2 06 22.1	1124.4	16 39.57	61 08.51
3	S II U	12 55 13.81	138.62	69.41	5 49 21.8	1102.3	16 37.34	61 00.38
3	II L	13 23 04.94	140.02	69.77	9 26 02.8	1061.4	16 33.76	60 47.27
4	S II U	13 51 16.66	142.03	70.30	-12 52 41.6	-1002.1	16 28.97	60 29.69
4	II L	14 19 55.47	144.50	70.95	16 05 45.0	925.7	16 23.12	60 08.18
5	S II U	14 49 05.73	147.23	71.67	19 01 54.2	833.4	16 16.38	59 43.46
5	II L	15 18 48.96	149.95	72.39	21 38 10.5	727.2	16 08.97	59 16.25
6	S II U	15 49 03.29	152.37	73.03	23 51 59.8	609.3	16 01.10	58 47.36
6	II L	16 19 43.31	154.18	73.52	-25 41 18.8	-482.6	15 52.97	58 17.55
7	S II U	16 50 40.07	155.11	73.79	27 04 40.4	350.3	15 44.80	57 47.54
7	II L	17 21 41.68	154.96	73.79	28 01 18.4	216.0	15 36.75	57 18.01
8	S II U	17 52 34.58	153.65	73.49	28 31 08.7	-83.0	15 28.99	56 49.53
8	II L	18 23 04.81	151.20	72.91	28 34 47.9	+45.4	15 21.65	56 22.57
9	N II U	18 52 59.54	147.77	72.06	-28 13 28.7	+166.4	15 14.82	55 57.52
9	II L	19 22 08.26	143.58	71.00	27 28 51.2	278.2	15 08.60	55 34.68
10	N II U	19 50 23.57	138.91	69.80	26 22 54.5	379.5	15 03.03	55 14.23
10	II L	20 17 41.36	134.04	68.51	24 57 47.3	469.9	14 58.15	54 56.33
11	N II U	20 44 00.69	129.21	67.20	23 15 40.5	549.5	14 53.98	54 41.03
11	II L	21 09 23.27	124.62	65.93	-21 18 40.8	+618.8	14 50.52	54 28.33
12	N II U	21 33 52.97	120.41	64.75	19 08 48.2	678.4	14 47.77	54 18.21
12	II L	21 57 35.12	116.71	63.68	16 47 54.2	729.2	14 45.60	54 10.58
13	N II U	22 20 36.17	113.57	62.75	14 17 40.7	771.8	14 44.26	54 05.34
13	II L	22 43 03.22	111.04	61.99	11 39 42.1	806.8	14 43.45	54 02.38
14	II U	23 05 03.78	109.16	61.41	-8 55 26.1	+834.7	14 43.23	54 01.54
14	II L	23 26 45.59	107.92	61.02	6 06 15.5	855.9	14 43.54	54 02.69
15	II U	23 48 16.47	107.34	60.81	3 13 30.8	870.4	14 44.35	54 05.66
15	II L	00 09 44.35	107.42	60.80	-0 18 31.7	878.3	14 45.61	54 10.20
16	II U	00 31 17.19	108.17	60.99	+2 37 20.9	879.3	14 47.28	54 16.44
16	II L	00 53 02.99	109.58	61.38	+5 32 42.3	+873.0	14 49.33	54 23.66
17	II U	01 15 09.71	111.65	61.96	8 26 02.8	859.1	14 51.72	54 32.72
17	II L	01 37 45.29	114.39	62.73	11 15 45.9	836.7	14 54.41	54 42.59
18	I U	01 58 50.11	117.58	63.67	14 00 05.8	805.1	14 57.37	54 53.47
19	I L	02 22 44.04	121.51	64.77	16 37 07.9	763.5	15 00.59	55 05.28
19	I U	02 47 28.36	125.96	66.01	+19 04 46.2	+711.0	15 04.05	55 17.97
20	I L	03 13 08.73	130.83	67.34	21 20 44.4	646.7	15 07.73	55 31.48
20	I U	03 39 49.13	135.94	68.71	23 22 37.6	570.0	15 11.62	55 45.77
21	I L	04 07 31.28	141.08	70.08	25 07 54.5	480.6	15 15.73	56 00.85
21	I U	04 36 13.92	145.97	71.36	26 34 02.2	378.6	15 20.04	56 16.69
22	I L	05 05 52.28	150.31	72.48	+27 38 34.1	+264.9	15 24.56	56 33.28
22	S I U	05 36 17.86	153.78	73.38	28 19 19.1	141.1	15 29.28	56 50.60
23	I L	06 07 18.65	156.14	74.00	28 34 30.6	+9.8	15 34.19	57 08.61
23	N I U	06 38 40.12	157.21	74.28	+28 22 56.7	-125.9	15 39.27	57 27.24

Apr. 3 U Defective Illumination of I 0°.05.
 Apr. 3 U Defective Illumination of N 0°.51.

Apr. 8 U Defective Illumination of N 1°.11.

AT TRANSIT AT GREENWICH.

Date.	Illuminated Limbs and Transit.	Apparent Right Ascension of Limb.	Var. per Hour of Long.	Sidereal Time of S. D. passing Meridian	Apparent Geocentric Declination of Centre.	Var. per Hour of Long.	Geocentric Semi-diameter.	Equatorial Horizontal Parallax.
Apr. 24	I L	^h 07 ^m 10 ^s 06.57	156.98	^s 74.24	[°] +27 44 06.3	- 262.3	15 44.48	57 46.38
24	N I U	07 41 22.82	155.55	73.90	26 38 12.2	395.9	15 49.80	58 05.80
25	I L	08 12 15.87	153.16	73.31	25 06 09.4	523.3	15 55.15	58 25.54
25	N I U	08 42 36.01	150.12	72.55	23 09 29.7	641.6	16 00.47	58 45.97
26	I L	09 12 17.45	146.77	71.69	20 50 14.5	748.9	16 05.67	59 01.17
26	N I U	09 41 18.39	143.42	70.82	+18 10 47.2	- 843.4	16 10.65	59 22.44
27	I L	10 09 40.55	140.35	70.01	15 13 48.1	924.1	16 15.20	59 30.45
27	N I U	10 37 28.58	137.76	69.32	12 02 07.2	990.2	16 19.45	59 54.72
28	I L	11 04 49.37	135.83	68.79	8 38 44.2	1041.1	16 23.00	60 07.77
28	N I U	11 31 51.42	134.65	68.45	5 06 45.1	1070.1	16 25.82	60 18.12
29	I L	11 58 44.22	134.29	68.33	+ 1 29 23.5	-1094.7	16 27.78	60 25.31
29	N I U	12 25 37.76	134.77	68.44	- 2 10 01.2	1096.5	16 28.77	60 28.94
30	I L	12 52 42.10	136.09	68.76	5 48 02.4	1080.7	16 28.71	60 28.74
30	N I U	13 20 06.93	138.18	69.29	9 21 07.7	1047.1	16 27.56	60 24.51
May 1	I L	13 48 00.97	140.94	69.99	12 45 41.1	995.4	16 25.31	60 16.23
1	S I U	14 16 31.40	144.21	70.82	-15 58 06.0	- 925.7	16 21.07	60 04.00
2	II L	14 48 06.54	147.92	71.72	18 54 49.1	838.0	16 17.64	59 48.07
3	S II U	15 18 03.12	151.48	72.62	21 32 28.6	735.4	16 12.40	59 28.84
3	II L	15 48 40.62	154.68	73.44	23 48 01.5	617.9	16 06.39	59 06.80
4	S II U	16 19 52.61	157.15	74.08	25 38 53.9	489.2	15 59.79	58 42.56
4	II L	16 51 28.35	158.58	74.47	-27 03 10.5	- 352.7	15 52.75	58 16.73
5	S II U	17 23 13.61	158.71	74.53	27 59 43.3	212.0	15 45.46	57 49.97
5	II L	17 54 51.87	157.42	74.26	28 28 16.0	- 73.4	15 38.10	57 22.04
6	S II U	18 26 06.26	154.76	73.64	28 29 23.8	+ 60.9	15 30.82	56 56.25
6	II L	18 56 41.41	150.93	72.73	28 04 27.2	186.9	15 23.79	56 30.41
7	N II U	19 26 24.98	146.22	71.57	-27 15 21.8	+ 302.1	15 17.13	56 05.90
7	II L	19 55 08.50	140.98	70.26	26 04 25.8	405.2	15 10.95	55 43.30
8	N II U	20 22 47.64	135.54	68.86	24 34 07.7	495.7	15 05.34	55 22.70
8	II L	20 49 21.82	130.20	67.46	22 46 56.8	574.1	15 00.36	55 04.14
9	N II U	21 14 53.56	125.17	66.11	20 45 15.1	641.0	14 56.07	54 48.70
9	II L	21 39 27.74	120.62	64.85	-18 31 13.8	+ 697.6	14 52.50	54 35.60
10	N II U	22 03 10.82	116.67	63.74	16 06 50.9	744.8	14 49.67	54 25.20
10	II L	22 26 10.34	113.37	62.79	13 33 52.0	783.7	14 47.58	54 17.51
11	N II U	22 48 34.44	110.77	62.02	10 53 51.5	815.2	14 46.22	54 12.53
11	II L	23 10 31.57	108.88	61.44	8 08 14.3	839.9	14 45.57	54 10.17
12	N II U	23 32 10.32	107.70	61.07	- 5 18 19.4	+ 858.2	14 45.02	54 10.34
12	II L	23 53 39.37	107.26	60.90	- 2 25 21.5	870.4	14 46.32	54 12.01
13	N II U	00 15 07.39	107.53	60.95	+ 0 29 25.5	876.4	14 47.04	54 17.74
13	II L	00 36 43.03	108.53	61.20	3 24 45.9	875.9	14 49.52	54 24.04
14	II U	00 58 34.99	110.25	61.66	6 19 19.8	868.5	14 51.91	54 33.42
14	II L	01 20 51.88	112.69	62.32	+ 9 11 39.9	+ 853.5	14 54.76	54 43.88
15	II U	01 43 42.23	115.82	63.17	12 00 10.0	830.0	14 58.01	54 55.79
15	II L	02 07 14.31	119.63	64.21	14 43 01.9	797.0	15 01.58	55 08.93
16	II U	02 31 35.85	124.06	65.40	+17 18 14.5	+ 753.3	15 05.44	55 23.06

May 1 U Defective Illumination of II 0°.14.
May 1 U Defective Illumination of N 0°.50.

May 6 U Defective Illumination of N 0°.52.

MOON, 1931.

AT TRANSIT AT GREENWICH.

Date.		Illuminated Limbs and Transit.	Apparent Right Ascension of Limb.	Var. per Hour of Long.	Sidereal Time of S. D. passing Meridian	Apparent Geocentric Declination of Centre.	Var. per Hour of Long.	Geocentric Semi-diameter.	Equatorial Horizontal Parallax.
			^h ^m ^s	^s	^s	[°] ['] ^{''}	^{''}	['] ^{''}	['] ^{''}
May	16	II L	02 56 53.70	129.00	66.72	+19 43 33.0	+ 697.7	15 09.50	55 37.97
	17	II U	03 23 13.16	134.30	68.12	21 56 29.1	629.4	15 13.71	55 53.43
	18	I L	03 48 18.36	139.52	69.54	23 54 23.6	547.4	15 18.01	56 09.23
	18	I U	04 16 44.92	144.86	70.92	25 34 31.6	451.6	15 22.36	56 25.20
	19	I L	04 46 13.24	149.75	72.16	26 54 08.8	342.4	15 26.71	56 41.16
	19	I U	05 16 35.83	153.84	73.20	+27 50 43.0	+ 221.4	15 31.02	56 56.97
	20	I L	05 47 40.98	156.79	73.95	28 22 05.6	+ 91.0	15 35.25	57 12.51
	20	I U	06 19 13.52	158.37	74.36	28 26 43.2	- 45.4	15 39.39	57 27.70
	21	I L	06 50 56.16	158.48	74.41	28 03 47.6	183.8	15 43.41	57 42.45
	21	N I U	07 22 31.43	157.17	74.12	27 13 20.3	320.0	15 47.30	57 56.72
	22	I L	07 53 43.57	154.68	73.53	+25 56 11.4	- 450.1	15 51.04	58 10.45
	22	N I U	08 24 20.23	151.32	72.72	24 13 54.1	571.0	15 54.62	58 23.60
	23	I L	08 54 13.23	147.47	71.78	22 08 34.1	680.3	15 58.03	58 36.11
	23	N I U	09 23 18.92	143.49	70.78	19 42 40.0	776.5	16 01.24	58 47.90
	24	I L	09 51 37.71	139.70	69.82	16 58 53.5	858.9	16 04.24	58 58.88
	24	N I U	10 19 13.47	136.35	68.95	+14 00 02.3	- 927.3	16 06.97	59 08.94
	25	I L	10 46 12.65	133.03	68.24	10 48 55.6	981.5	16 09.42	59 17.91
	25	N I U	11 12 43.63	131.67	67.71	7 28 22.4	1021.7	16 11.52	59 25.61
	26	I L	11 38 55.98	130.54	67.40	4 01 11.2	1047.8	16 13.21	59 31.82
	26	N I U	12 05 00.08	130.29	67.32	+ 0 30 11.3	1059.8	16 14.43	59 36.31
	27	I L	12 31 06.60	130.94	67.47	- 3 01 45.4	-1057.2	16 15.12	59 38.84
	27	N I U	12 57 26.18	132.47	67.85	6 31 42.3	1039.7	16 15.22	59 39.19
	28	I L	13 24 09.02	134.81	68.44	9 56 36.6	1006.7	16 14.66	59 37.16
	28	N I U	13 51 24.49	137.88	69.22	13 13 19.6	957.7	16 13.41	59 32.57
	29	I L	14 19 20.48	141.53	70.13	16 18 36.2	892.3	16 11.44	59 25.34
	29	N I U	14 48 02.66	145.54	71.13	-19 09 08.7	- 810.4	16 08.74	59 15.42
	30	I L	15 17 33.76	149.63	72.14	21 41 41.8	712.5	16 05.32	59 02.88
	30	S I U	15 47 52.60	153.44	73.07	23 53 10.5	599.9	16 01.24	58 47.89
	31	I L	16 18 53.54	156.57	73.84	25 40 50.8	474.9	15 56.54	58 30.65
June	1	S II U	16 52 54.72	158.72	74.35	27 02 31.4	340.6	15 51.33	58 11.51
	1	II L	17 24 45.25	159.41	74.53	-27 56 45.0	- 201.2	15 45.70	57 50.84
	2	S II U	17 56 34.73	158.57	74.35	28 22 56.8	- 61.1	15 39.77	57 29.10
	2	II L	18 28 04.95	156.22	73.80	28 21 27.0	+ 75.0	15 33.68	57 06.75
	3	S II U	18 58 58.76	152.54	72.93	27 53 27.2	203.3	15 27.56	56 44.27
	3	II L	19 29 01.99	147.85	71.80	27 00 50.4	320.7	15 21.53	56 22.15
	4	N II U	19 58 04.63	142.51	70.48	-25 45 59.3	+ 425.5	15 15.72	56 00.80
	4	II L	20 26 01.19	136.90	69.06	24 11 30.6	517.0	15 10.23	55 40.66
	5	N II U	20 52 50.32	131.33	67.62	22 20 04.4	595.2	15 05.17	55 22.08
	5	II L	21 18 34.22	126.06	66.23	20 14 14.5	661.1	15 00.62	55 05.37
	6	N II U	21 43 17.66	121.28	64.95	17 56 23.1	715.7	14 56.65	54 50.80
	6	II L	22 07 07.32	117.11	63.81	-15 28 37.6	+ 760.3	14 53.31	54 38.57
	7	N II U	22 30 11.03	113.63	62.84	12 52 51.3	796.1	14 50.67	54 28.85
	7	II L	22 52 37.28	110.87	62.05	10 10 43.2	824.1	14 48.73	54 21.75
	8	N II U	23 14 35.00	108.87	61.47	- 7 23 41.2	+ 845.2	14 47.53	54 17.35

May 30 U Defective Illumination of N 1°.14.

June 3 U Defective Illumination of N 0°.65.

MOON, 1931. AT TRANSIT AT GREENWICH.

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Date.	Illum- inated Limbs and Transit.	Appar- ent Right Ascension of Limb.	Var. per Hour of Long.	Sidereal Time of S. D. passing Meridian	Appar- ent Geocentric Declination of Centre.	Var. per Hour of Long.	Geocentric Semi- diameter.	Equa- torial Hori- zontal Parallax.
June 8	II L	^h ^m ^s 23 36 13.22	^s 107.63	^s 61.10	[°] ['] ["] - 4 33 04.2	["] + 860.0	['] ["] 14 47.08	["] 54 15.69
9	N II U	23 57 41.09	107.15	60.95	- 1 40 05.9	868.8	14 47.37	54 16.74
9	II L	00 19 07.78	107.43	61.01	+ 1 14 03.6	871.8	14 48.38	54 20.47
10	N II U	00 40 42.49	108.48	61.29	4 08 13.1	868.7	14 50.10	54 26.78
10	II L	01 02 34.46	110.31	61.78	7 01 07.4	859.2	14 52.49	54 35.56
11	N II U	01 24 52.95	112.90	62.49	+ 9 51 25.7	+ 842.6	14 55.51	54 46.64
11	II L	01 47 47.14	116.26	63.41	12 37 36.1	817.8	14 59.11	54 59.83
12	N II U	02 11 26.02	120.34	64.51	15 17 54.6	783.7	15 03.21	55 14.88
12	II L	02 35 58.06	125.10	65.78	17 50 22.3	739.0	15 07.74	55 31.53
13	II U	03 01 30.82	130.44	67.18	20 12 43.2	682.3	15 12.63	55 49.48
13	II L	03 28 10.27	136.19	68.67	+22 22 24.8	+ 612.3	15 17.78	56 08.39
14	II U	03 55 59.95	142.10	70.18	24 16 40.3	527.8	15 23.10	56 27.91
14	II L	04 25 00.08	147.87	71.62	25 52 33.2	428.5	15 28.49	56 47.67
15	II U	04 55 06.60	153.10	72.92	27 07 06.4	314.7	15 33.84	57 07.30
15	II L	05 26 10.63	157.38	73.97	27 57 34.9	188.1	15 39.05	57 26.44
16	I U	05 55 29.05	160.25	74.71	+28 21 40.2	+ 51.4	15 44.03	57 44.74
17	I L	06 27 42.41	161.69	75.06	28 17 45.4	- 91.2	15 48.71	58 01.89
17	I U	07 00 03.01	161.46	75.01	27 45 07.3	235.0	15 52.99	58 17.61
18	I L	07 32 11.26	159.66	74.59	26 44 01.3	375.0	15 56.83	58 31.72
18	I U	08 03 49.86	156.58	73.86	25 15 40.1	506.8	16 00.19	58 44.06
19	I L	08 34 45.64	152.60	72.91	+23 22 05.1	- 626.8	16 03.05	58 54.54
19	N I U	09 04 50.43	148.15	71.82	21 05 52.9	732.7	16 05.40	59 03.15
20	I L	09 34 01.07	143.64	70.71	18 30 02.8	823.0	16 07.24	59 09.92
20	N I U	10 02 18.88	139.40	69.65	15 37 44.1	897.4	16 08.60	59 14.90
21	I L	10 29 48.67	135.68	68.70	12 32 07.3	956.1	16 09.49	59 18.18
21	N I U	10 56 37.85	132.65	67.93	+ 9 16 18.0	- 999.6	16 09.95	59 19.87
22	I L	11 22 55.60	130.45	67.37	5 53 16.3	1028.4	16 10.01	59 20.07
22	N I U	11 48 52.15	129.13	67.02	+ 2 25 54.1	1043.1	16 09.68	59 18.85
23	I L	12 14 38.33	128.72	66.92	- 1 03 02.3	1044.1	16 08.98	59 16.31
23	N I U	12 40 25.11	129.23	67.06	4 30 49.7	1031.6	16 07.94	59 12.48
24	I L	13 06 23.33	130.62	67.42	- 7 54 46.6	-1005.6	16 06.56	59 07.40
24	N I U	13 32 43.28	132.84	67.99	11 12 09.3	965.9	16 04.83	59 01.07
25	I L	13 59 34.37	135.79	68.75	14 20 11.8	912.2	16 02.76	58 53.48
25	N I U	14 27 04.54	139.32	69.64	17 16 03.8	844.1	16 00.35	58 44.62
26	I L	14 55 19.60	143.23	70.62	19 56 52.6	761.6	15 57.58	58 34.47
26	N I U	15 24 22.56	147.25	71.60	-22 19 46.3	- 665.0	15 54.46	58 23.02
27	I L	15 54 12.74	151.04	72.52	24 22 00.7	555.2	15 51.00	58 10.31
27	S I U	16 24 45.16	154.23	73.28	26 01 06.9	434.0	15 47.21	57 56.38
28	I L	16 55 50.42	156.45	73.80	27 15 02.7	304.1	15 43.10	57 41.32
28	S I U	17 27 14.97	157.40	74.01	28 02 23.6	168.9	15 38.73	57 25.26
29	I L	17 58 42.36	156.90	73.86	-28 22 31.5	- 32.6	15 34.13	57 08.37
30	S I U	18 29 54.91	154.94	73.37	28 15 39.0	+ 100.5	15 29.36	56 50.89
30	II L	19 03 00.79	151.49	72.55	-27 42 47.8	+ 226.6	15 24.50	56 33.05

June 27 U Defective Illumination of N 0°.05.

June 30 U Defective Illumination of II 0°.00.

MOON, 1931.

AT TRANSIT AT GREENWICH.

Date.	Illuminated Limbs and Transit.	Apparent Right Ascension of Limb.	Var. per Hour of Long.	Sidereal Time of S. D. passing Meridian	Apparent Geocentric Declination of Centre.	Var. per Hour of Long.	Geocentric Semi-diameter.	Equatorial Horizontal Parallax.
July 1	S II U	^h 19 ^m 32 ^s 53.31	^s 147.12	^s 71.47	[°] -26 ['] 45 ["] 41.4	["] + 342.6	['] 15 19.62	['] 56 15.14
1	II L	20 01 48.82	142.05	70.20	25 26 34.3	446.4	15 14.81	55 57.46
2	N II U	20 29 41.21	136.65	68.83	23 47 58.9	537.2	15 10.13	55 40.31
2	II L	20 56 28.44	131.24	67.44	21 52 33.7	614.8	15 05.69	55 23.99
3	N II U	21 22 11.97	126.08	66.09	19 42 54.1	679.7	15 01.55	55 08.80
3	II L	21 46 55.98	121.35	64.82	-17 21 26.6	+ 733.0	14 57.80	54 55.03
4	N II U	22 10 46.62	117.20	63.70	14 50 24.1	775.8	14 54.50	54 42.92
4	II L	22 33 51.28	113.70	62.75	12 11 45.6	809.2	14 51.72	54 32.72
5	N II U	22 56 18.14	110.90	61.97	9 27 16.4	834.4	14 49.52	54 24.65
5	II L	23 18 15.87	108.84	61.40	6 38 29.4	852.3	14 47.95	54 18.87
6	N II U	23 39 53.38	107.53	61.04	- 3 46 48.1	+ 863.6	14 47.04	54 15.54
6	II L	00 01 19.67	106.98	60.89	- 0 53 28.3	868.8	14 46.83	54 14.78
7	N II U	00 22 43.87	107.18	60.96	+ 2 00 18.4	868.1	14 47.35	54 16.67
7	II L	00 44 15.20	108.16	61.24	4 53 21.4	861.5	14 48.60	54 21.26
8	N II U	01 06 02.94	109.92	61.75	7 44 28.6	848.7	14 50.59	54 28.56
8	II L	01 28 16.46	112.46	62.47	+10 32 22.6	+ 829.2	14 53.30	54 38.53
9	N II U	01 51 05.16	115.78	63.39	13 15 37.6	802.0	14 56.73	54 51.11
9	II L	02 14 38.32	119.87	64.51	15 52 36.3	766.2	15 00.83	55 06.17
10	N II U	02 39 04.83	124.67	65.81	18 21 26.6	720.4	15 05.56	55 23.52
10	II L	03 04 32.81	130.09	67.24	20 40 00.0	663.1	15 10.85	55 42.95
11	N II U	03 31 08.91	135.99	68.77	+22 45 50.0	+ 592.9	15 16.63	56 04.17
11	II L	03 58 57.53	142.14	70.33	24 36 13.4	508.5	15 22.81	56 26.83
12	II U	04 27 59.84	148.21	71.85	26 08 14.5	409.1	15 29.26	56 50.52
12	II L	04 58 12.68	153.82	73.22	27 18 52.4	294.7	15 35.87	57 14.78
13	II U	05 29 27.93	158.53	74.36	28 05 13.9	166.7	15 42.50	57 39.10
13	II L	06 01 32.27	161.93	75.17	+28 24 48.6	+ 27.5	15 48.99	58 02.03
14	II U	06 34 08.02	163.72	75.59	28 15 46.0	- 118.8	15 55.20	58 25.73
14	II L	07 06 54.82	163.77	75.60	27 37 10.3	267.1	16 00.98	58 41.94
15	I U	07 37 01.56	162.25	75.21	26 29 07.9	412.2	16 06.19	59 06.06
16	I L	08 09 12.08	159.29	74.49	24 52 49.8	549.0	16 10.71	59 22.63
16	I U	08 40 40.68	155.34	73.53	+22 50 22.7	- 673.1	16 14.43	59 36.32
17	I L	09 11 18.13	150.85	72.43	20 24 37.7	781.6	16 17.32	59 46.90
17	I U	09 41 00.46	146.23	71.29	17 38 53.6	872.7	16 19.31	59 54.22
18	I L	10 09 48.49	141.85	70.21	14 36 44.5	945.7	16 20.41	59 58.27
18	I U	10 37 46.77	137.98	69.24	11 21 47.7	1000.8	16 20.66	59 59.16
19	I L	11 05 02.67	134.81	68.45	+ 7 57 36.4	-1038.3	16 20.09	59 57.07
19	N I U	11 31 45.32	132.45	67.86	4 27 34.9	1059.3	16 18.78	59 52.26
20	I L	11 58 05.01	130.98	67.50	+ 0 54 56.6	1064.6	16 16.81	59 45.03
20	N I U	12 24 12.47	130.42	67.38	- 2 37 15.6	1055.0	16 14.27	59 35.73
21	I L	12 50 18.58	130.75	67.49	6 06 07.5	1031.3	16 11.27	59 24.70
21	N I U	13 16 33.83	131.94	67.82	- 9 28 52.7	- 994.0	16 07.88	59 12.27
22	I L	13 43 08.13	133.91	68.35	12 42 49.4	943.3	16 04.19	58 58.74
22	N I U	14 10 10.27	136.55	69.04	15 45 18.8	879.5	16 00.28	58 44.37
23	I L	14 37 47.42	139.71	69.86	18 33 44.4	802.7	15 56.20	58 29.40
23	N I U	15 06 04.56	143.18	70.73	-21 05 32.7	- 713.3	15 52.01	58 14.02

July 2 U Defective Illumination of S o°-10.

MOON, 1931.

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AT TRANSIT AT GREENWICH.

Date.	Illum- inated Limbs and Transit.	Apparent Right Ascension of Limb.	Var. per Hour of Long.	Sidereal Time of S. D. passing Meridian	Apparent Geocentric Declination of Centre.	Var. per Hour of Long.	Geocentric Semi- diameter.	Equa- torial Hori- zontal Parallax.
July 24	I L	^h 15 ^m 35 ^s 03·85	^s 146·69	^s 71·60	— 23 18 15·3	— 611·9	15 47·75	5' 58·37
24	N I U	16 04 43·91	149·92	72·38	25 09 34·3	499·6	15 43·44	57 42·57
25	I L	16 34 59·43	152·54	73·00	26 37 28·6	378·1	15 39·12	57 26·68
25	S I U	17 05 41·21	154·24	73·39	27 40 23·1	250·1	15 34·79	57 10·80
26	I L	17 36 36·54	154·76	73·47	28 17 16·9	— 118·6	15 30·47	56 54·90
26	S I U	18 07 30·39	153·98	73·24	— 28 27 49·7	+ 12·8	15 26·19	56 39·23
27	I L	18 38 06·98	151·90	72·69	28 12 24·1	140·5	15 21·95	56 23·67
27	S I U	19 08 11·44	148·66	71·85	27 32 04·9	261·2	15 17·77	56 08·34
28	I L	19 37 31·31	144·52	70·78	26 28 32·5	372·4	15 13·68	55 53·33
28	S I U	20 05 57·53	139·78	69·55	25 03 53·5	472·1	15 09·70	55 38·73
29	II L	20 35 41·23	134·52	68·24	— 23 20 30·5	+ 559·6	15 05·87	55 24·66
30	S II U	21 02 05·04	129·48	66·91	21 20 52·9	634·6	15 02·22	55 11·27
30	II L	21 27 29·56	124·67	65·62	19 07 28·4	697·5	14 58·79	54 58·69
31	N II U	21 51 58·66	120·26	64·43	16 42 38·0	749·1	14 55·63	54 47·09
31	II L	22 15 37·92	116·38	63·37	14 08 32·5	790·2	14 52·79	54 36·66
Aug. 1	N II U	22 38 34·22	113·11	62·46	— 11 27 11·2	+ 821·9	14 50·32	54 27·57
1	II L	23 00 55·13	110·49	61·74	8 40 21·6	845·1	14 48·25	54 20·00
2	N II U	23 22 48·66	108·55	61·21	5 49 40·4	860·6	14 46·66	54 14·14
2	II L	23 44 23·16	107·32	60·88	2 56 35·7	869·1	14 45·58	54 10·18
3	N II U	00 05 47·08	106·79	60·76	— 0 02 28·0	871·1	14 45·06	54 08·27
3	II L	00 27 09·05	106·99	60·84	+ 2 51 26·5	+ 866·9	14 45·14	54 08·58
4	N II U	00 48 37·74	107·92	61·14	5 43 53·8	856·6	14 45·87	54 11·24
4	II L	01 10 21·96	109·58	61·64	8 33 40·0	840·0	14 47·26	54 16·36
5	N II U	01 32 30·60	111·99	62·35	11 19 26·9	816·7	14 49·36	54 24·05
5	II L	01 55 12·61	115·14	63·26	13 59 50·8	786·1	14 52·17	54 34·36
6	N II U	02 18 36·79	119·02	64·36	+ 16 33 18·7	+ 747·2	14 55·69	54 47·30
6	II L	02 42 51·69	123·58	65·61	18 58 05·0	698·9	14 59·93	55 02·87
7	N II U	03 08 05·15	128·76	67·02	21 12 10·8	640·2	15 04·87	55 21·00
7	II L	03 34 23·73	134·41	68·51	23 13 21·1	569·5	15 10·47	55 41·54
8	N II U	04 01 52·06	140·34	70·05	24 59 05·4	485·7	15 16·67	56 04·30
8	II L	04 30 31·84	146·27	71·55	+ 26 26 41·3	+ 387·9	15 23·41	56 29·02
9	N II U	05 00 21·01	151·84	72·93	27 33 19·1	276·0	15 30·58	56 55·35
9	II L	05 31 13·00	156·66	74·10	28 16 13·3	150·8	15 38·07	57 22·84
10	S II U	06 02 56·39	160·35	74·97	28 32 54·9	+ 14·4	15 45·73	57 50·97
10	II L	06 35 15·62	162·59	75·49	28 21 27·0	— 130·1	15 53·40	58 19·13
11	II U	07 07 52·15	163·22	75·62	+ 27 40 39·5	— 278·1	16 00·90	58 46·66
11	II L	07 40 26·69	162·28	75·37	26 30 19·2	424·6	16 08·04	59 12·81
12	II U	08 12 41·39	159·97	74·79	24 51 14·3	564·7	16 14·61	59 36·96
12	II L	08 44 21·88	156·64	73·96	22 45 11·3	693·6	16 20·43	59 58·32
13	II U	09 15 18·42	152·72	72·99	20 14 46·1	807·8	16 25·33	60 16·33
14	I L	09 43 02·41	148·77	71·96	+ 17 23 11·8	— 904·8	16 29·18	60 30·45
14	I U	10 12 23·52	144·80	70·96	14 14 06·1	982·9	16 31·87	60 40·31
15	I L	10 40 59·35	141·27	70·07	10 51 19·3	1041·6	16 33·34	60 45·70
15	I U	11 08 56·40	138·36	69·35	7 18 45·5	1080·8	16 33·58	60 46·58
16	I L	11 36 23·08	136·22	68·82	+ 3 40 15·6	— 1101·1	16 32·62	60 43·08

July 25 U Defective Illumination of N 0°·03.

July 31 U Defective Illumination of S 0°·47.

MOON, 1931.

AT TRANSIT AT GREENWICH.

Date.	Illuminated Limbs and Transit.	Apparent Right Ascension of Limb.	Var. per Hour of Long.	Sidereal Time of S. D. passing Meridian	Apparent Geocentric Declination of Centre.	Var. per Hour of Long.	Geocentric Semi-diameter.	Equatorial Horizontal Parallax.
Aug. 16	I U	^{h m s} 12 03 29.08	^s 134.92	^s 68.51	— 0 00 26.8	—1103.1	16 30.55	60 35.47
17	I L	12 30 24.58	134.48	68.43	3 39 48.3	1087.7	16 27.47	60 24.15
17	N I U	12 57 19.89	134.88	68.57	7 14 26.5	1056.0	16 23.51	60 09.63
18	I L	13 24 24.84	136.07	68.92	10 41 09.9	1008.8	16 18.83	59 52.45
18	N I U	13 51 48.41	137.97	69.44	13 56 57.8	946.9	16 13.58	59 33.19
19	I L	14 19 38.26	140.42	70.10	—16 58 58.9	— 871.1	16 07.92	59 12.42
19	N I U	14 48 00.08	143.26	70.85	19 44 32.5	782.4	16 02.00	58 50.67
20	I L	15 16 57.14	146.25	71.62	22 11 08.9	681.8	15 55.94	58 28.43
20	N I U	15 46 29.59	149.11	72.34	24 16 32.8	570.5	15 49.85	58 06.10
21	I L	16 16 34.10	151.54	72.95	25 58 46.7	450.5	15 43.85	57 44.06
21	N I U	16 47 03.68	153.24	73.35	—27 16 18.1	— 323.9	15 38.00	57 22.57
22	I L	17 17 48.03	153.96	73.50	28 08 04.6	193.5	15 32.35	57 01.87
22	S I U	17 48 34.27	153.54	73.36	28 33 39.1	— 62.4	15 26.97	56 42.09
23	I L	18 19 08.27	151.93	72.92	28 33 13.0	+ 66.1	15 21.86	56 23.36
23	S I U	18 49 16.08	149.20	72.20	28 07 35.0	189.1	15 17.06	56 05.73
24	I L	19 18 45.40	145.55	71.23	—27 18 07.8	+ 303.9	15 12.56	55 49.22
24	S I U	19 47 26.54	141.22	70.09	26 06 41.0	408.8	15 08.38	55 33.86
25	I L	20 15 13.10	136.50	68.83	24 35 21.4	502.5	15 04.50	55 19.62
25	S I U	20 42 01.99	131.65	67.52	22 46 26.5	584.7	15 00.92	55 06.51
26	I L	21 07 53.14	126.91	66.23	20 42 16.1	655.2	14 57.65	54 54.50
26	S I U	21 32 48.99	122.46	65.00	—18 25 07.1	+ 714.5	14 54.68	54 43.60
27	I L	21 56 53.89	118.44	63.88	15 57 10.2	763.3	14 52.02	54 33.82
28	S I U	22 20 13.53	114.93	62.90	13 20 27.5	802.3	14 49.66	54 25.18
28	II L	22 44 58.75	111.89	62.08	10 36 52.0	832.2	14 47.63	54 17.73
29	N II U	23 07 07.13	109.62	61.43	7 48 07.9	853.8	14 45.94	54 11.51
29	II L	23 28 52.09	107.99	60.97	— 4 55 51.4	+ 867.7	14 44.62	54 06.65
30	N II U	23 50 21.39	107.01	60.70	— 2 01 31.5	874.4	14 43.68	54 03.21
30	II L	00 11 42.96	106.69	60.63	+ 0 53 27.2	874.3	14 43.16	54 01.32
31	N II U	00 33 04.73	107.05	60.76	3 47 43.8	867.4	14 43.10	54 01.08
31	II L	00 54 34.77	108.07	61.09	6 39 59.1	854.0	14 43.52	54 02.63
Sept. 1	N II U	01 16 21.13	109.77	61.60	+ 9 28 53.0	+ 833.8	14 44.47	54 06.11
1	II L	01 38 31.91	112.14	62.31	12 13 03.1	806.6	14 45.98	54 11.64
2	N II U	02 01 15.17	115.18	63.21	14 51 01.6	771.8	14 48.07	54 19.33
2	II L	02 24 38.73	118.86	64.27	17 21 14.0	728.8	14 50.79	54 29.31
3	N II U	02 48 50.05	123.13	65.48	19 41 56.5	676.7	14 54.15	54 41.66
3	II L	03 13 55.82	127.91	66.81	+21 51 15.0	+ 614.6	14 58.18	54 56.43
4	N II U	03 40 01.43	133.08	68.21	23 47 03.7	541.6	15 02.87	55 13.66
4	II L	04 07 10.49	138.45	69.63	25 27 05.9	456.8	15 08.23	55 33.31
5	N II U	04 35 23.98	143.77	71.02	26 48 56.8	359.6	15 14.23	55 55.33
5	II L	05 04 39.63	148.75	72.29	27 50 08.3	250.2	15 20.83	56 19.56
6	N II U	05 34 51.43	153.07	73.37	+28 28 16.9	+ 129.3	15 27.97	56 45.76
6	II L	06 05 49.48	156.41	74.19	28 41 13.3	— 1.4	15 35.56	57 13.63
7	S II U	06 37 20.53	158.54	74.69	28 27 15.0	139.3	15 43.49	57 42.74
7	II L	07 09 09.11	159.32	74.86	+27 45 16.0	— 280.9	15 51.62	58 12.60

Aug. 22 U Defective Illumination of N 0°.59.
 Aug. 28 U Defective Illumination of II 0°.00.

Aug. 29 U Defective Illumination of S 0°.25.

AT TRANSIT AT GREENWICH.

Date.	Illuminated Limbs and Transit.	Apparent Right Ascension of Limb.	Var. per Hour of Long.	Sidereal Time of S. D. passing Meridian	Apparent Geocentric Declination of Centre.	Var. per Hour of Long.	Geocentric Semi-diameter.	Equatorial Horizontal Parallax.
Sept. 8	S II U	^h 07 ^m 40 ^s 59.10	^s 158.79	^s 74.71	+26 34 56.1	- 422.0	15 59.79	58 42.57
8	II L	08 12 35.59	157.11	74.26	24 56 45.4	558.7	16 07.80	59 11.96
9	II U	08 43 46.42	154.57	73.61	22 52 02.1	686.8	16 15.44	59 40.00
9	II L	09 14 23.24	151.51	72.82	20 22 50.3	802.9	16 22.49	60 05.90
10	II U	09 44 21.85	148.26	71.98	17 31 51.1	904.3	16 28.75	60 28.85
10	II L	10 13 42.05	145.15	71.17	+14 22 14.9	- 988.8	16 34.00	60 48.12
11	II U	10 42 27.11	142.44	70.46	10 57 33.8	1054.9	16 38.06	61 03.05
11	II L	11 10 42.89	140.31	69.90	7 21 34.8	1101.7	16 40.81	61 13.11
12	I U	11 36 18.22	138.93	69.53	+ 3 38 13.0	1128.6	16 42.13	61 17.99
13	I L	12 04 00.53	138.26	69.37	- 0 08 32.6	1135.6	16 42.01	61 17.54
13	I U	12 31 39.66	138.40	69.42	- 3 54 43.4	-1122.9	16 40.46	61 11.85
14	I L	12 59 25.25	139.33	69.69	7 36 25.6	1091.0	16 37.56	61 01.19
14	I U	13 27 26.44	140.99	70.15	11 09 51.9	1040.4	16 33.43	60 46.03
15	I L	13 55 51.31	143.25	70.77	14 31 25.2	972.3	16 28.23	60 26.06
15	I U	14 24 46.19	145.96	71.49	17 37 41.5	887.8	16 22.10	60 04.69
16	I L	14 54 15.10	148.88	72.27	-20 25 32.5	- 788.4	16 15.43	59 39.97
16	N I U	15 24 18.98	151.74	73.01	22 52 10.1	675.9	16 08.22	59 13.53
17	I L	15 54 55.26	154.22	73.65	24 55 10.7	552.6	16 00.75	58 46.09
17	N I U	16 25 57.53	156.01	74.11	26 32 41.8	421.5	15 53.18	58 18.31
18	I L	16 57 15.77	156.84	74.33	27 43 26.6	285.5	15 45.68	57 50.78
18	N I U	17 28 37.12	156.51	74.24	-28 26 49.4	- 148.4	15 38.38	57 23.99
19	I L	17 59 47.09	154.94	73.85	28 42 56.6	- 13.5	15 31.39	56 58.33
19	S I U	18 30 31.16	152.21	73.15	28 32 36.1	+ 115.7	15 24.79	56 34.11
20	I L	19 00 36.25	148.49	72.19	27 57 11.5	236.8	15 18.65	56 11.55
20	S I U	19 29 51.95	144.03	71.03	26 58 34.0	347.6	15 12.99	55 50.79
21	I L	19 58 11.17	139.13	69.73	-25 38 53.0	+ 447.2	15 07.84	55 31.89
21	S I U	20 25 30.31	134.06	68.37	24 00 27.6	535.0	15 03.21	55 14.90
22	I L	20 51 48.98	129.08	67.01	22 05 38.6	611.2	14 59.10	54 59.80
22	S I U	21 17 09.35	124.38	65.70	19 56 43.1	676.3	14 55.48	54 46.54
23	I L	21 41 35.74	120.10	64.49	17 35 50.5	730.8	14 52.35	54 35.05
23	S I U	22 05 13.83	116.34	63.41	-15 05 02.5	+ 775.7	14 49.69	54 25.25
24	I L	22 28 10.21	113.16	62.49	12 26 10.8	811.5	14 47.46	54 17.07
24	S I U	22 50 32.15	110.60	61.74	9 40 59.1	839.1	14 45.65	54 10.44
25	I L	23 12 27.14	108.67	61.17	6 51 03.7	858.9	14 44.24	54 05.28
25	S I U	23 34 02.86	107.39	60.78	3 57 55.4	871.3	14 43.22	54 01.54
26	I L	23 55 27.02	106.75	60.60	- 1 03 00.4	+ 876.7	14 42.58	53 59.19
26	N II U	00 18 48.55	106.76	60.60	+ 1 52 17.6	875.2	14 42.32	53 58.20
27	II L	00 40 13.11	107.44	60.80	4 46 35.5	866.7	14 42.42	53 58.59
28	N II U	01 01 49.53	108.74	61.18	7 38 29.5	851.2	14 42.90	54 00.36
28	II L	01 23 45.39	110.67	61.75	10 26 34.0	828.3	14 43.78	54 03.57
29	N II U	01 46 08.13	113.22	62.50	+13 09 18.9	+ 797.8	14 45.06	54 08.27
29	II L	02 09 04.98	116.35	63.41	15 45 09.4	759.2	14 46.76	54 14.53
30	N II U	02 32 42.70	120.02	64.46	18 12 23.7	711.7	14 48.92	54 22.44
30	II L	02 57 07.43	124.17	65.64	+20 29 13.0	+ 654.9	14 51.55	54 32.10

Sept. 26 U Defective Illumination of I 0^h.03.Sept. 26 U Defective Illumination of S 0^h.00.

AT TRANSIT AT GREENWICH.

Date.	Illuminated Limbs and Transit.	Apparent Right Ascension of Limb.	Var. per Hour of Long.	Sidereal Time of S. D. passing Meridian	Apparent Geocentric Declination of Centre.	Var. per Hour of Long.	Geocentric Semi-diameter.	Equatorial Horizontal Parallax.
Oct. 1	N II U	^h 03 ^m 22 ^s 24.26	^s 128.69	^s 66.89	[°] +22 ['] 33 ["] 40.3	["] + 588.0	['] 14 54.68	["] 54 43.59
1	II L	03 48 36.76	133.42	68.20	24 23 41.7	510.4	14 58.33	54 56.90
2	N II U	04 15 46.48	138.19	69.49	25 57 07.5	422.0	15 02.52	55 12.38
2	II L	04 43 52.41	142.75	70.70	27 11 46.9	322.7	15 07.27	55 29.79
3	N II U	05 12 50.50	146.84	71.77	28 05 31.8	213.1	15 12.57	55 49.25
3	II L	05 42 33.58	150.20	72.65	+28 36 25.0	+ 94.4	15 18.41	56 10.69
4	S II U	06 12 51.51	152.61	73.28	28 42 47.3	- 31.7	15 24.77	56 34.04
4	II L	06 43 31.99	153.93	73.62	28 23 26.0	162.5	15 31.60	56 59.12
5	S II U	07 14 21.56	154.13	73.67	27 37 41.3	295.1	15 38.84	57 25.67
5	II L	07 45 07.13	153.29	73.46	26 25 30.2	426.3	15 46.39	57 53.37
6	S II U	08 15 37.23	151.60	73.02	+24 47 27.5	- 553.1	15 54.12	58 21.77
6	II L	08 45 43.11	149.31	72.42	22 44 44.1	672.6	16 01.91	58 50.35
7	S II U	09 15 19.42	146.72	71.74	20 19 03.2	782.4	16 09.57	59 18.48
7	II L	09 44 24.27	144.11	71.04	17 32 35.3	880.2	16 16.93	59 45.47
8	II U	10 12 59.04	141.75	70.40	14 27 54.4	964.2	16 23.76	60 10.57
8	II L	10 41 07.94	139.83	69.87	+11 07 54.8	-1033.1	16 29.88	60 33.00
9	II U	11 08 57.43	138.53	69.50	7 35 47.3	1085.3	16 35.05	60 52.00
9	II L	11 36 35.59	137.96	69.32	3 54 58.2	1119.8	16 39.10	61 06.87
10	II U	12 04 11.58	138.18	69.36	+ 0 09 07.0	1135.5	16 41.87	61 17.01
10	II L	12 31 55.12	139.22	69.61	- 3 37 55.6	1131.5	16 43.22	61 21.99
11	II U	12 59 55.95	141.05	70.07	- 7 22 09.8	-1107.3	16 43.11	61 21.57
12	I L	13 26 01.77	143.48	70.73	10 59 31.4	1062.7	16 41.51	61 15.70
12	I U	13 55 01.78	140.60	71.53	14 25 54.5	997.7	16 38.48	61 04.58
13	I L	14 24 41.82	150.12	72.44	17 37 18.8	913.1	16 34.13	60 48.60
13	I U	14 55 05.04	153.75	73.37	20 29 56.1	810.2	16 28.61	60 28.34
14	I L	15 26 10.81	157.15	74.24	-23 00 18.7	- 691.1	16 22.11	60 04.49
14	I U	15 57 54.16	159.94	74.95	25 05 30.3	558.9	16 14.65	59 37.81
15	I L	16 30 05.50	161.75	75.42	26 43 14.8	417.3	16 07.05	59 09.23
15	N I U	17 02 31.08	162.27	75.57	27 52 06.1	270.8	15 58.94	58 39.46
16	I L	17 34 54.24	161.33	75.37	28 31 33.8	- 124.2	15 50.73	58 09.30
16	N I U	18 06 57.22	158.92	74.80	-28 42 02.5	+ 18.2	15 42.59	57 39.44
17	I L	18 38 23.19	155.21	73.90	28 24 48.5	152.4	15 34.70	57 10.17
17	S I U	19 08 58.11	150.47	72.73	27 41 47.8	275.6	15 27.18	56 42.87
18	I L	19 38 31.84	145.07	71.36	26 35 23.9	386.1	15 20.14	56 17.02
18	S I U	20 06 58.58	139.37	69.88	25 08 14.7	483.2	15 13.65	55 53.21
19	I L	20 34 16.62	133.67	68.38	-23 23 00.7	+ 567.0	15 07.77	55 31.63
19	S I U	21 00 27.69	128.24	66.91	21 22 16.4	638.4	15 02.53	55 12.39
20	I L	21 25 36.15	123.26	65.53	19 08 26.0	698.2	14 57.94	54 55.55
20	S I U	21 49 48.14	118.85	64.28	16 43 40.9	747.7	14 54.01	54 41.12
21	I L	22 13 11.01	115.08	63.20	14 09 59.3	787.8	14 50.72	54 29.04
21	S I U	22 35 52.73	111.99	62.29	-11 29 07.0	+ 819.6	14 48.05	54 19.24
22	I L	22 58 01.58	109.60	61.57	8 42 40.1	843.7	14 45.97	54 11.61
22	S I U	23 19 45.93	107.91	61.05	5 52 06.7	860.7	14 44.46	54 06.07
23	I L	23 41 14.11	106.90	60.73	2 58 49.7	871.0	14 43.48	54 02.46
23	S I U	00 02 34.37	106.58	60.61	- 0 04 08.8	+ 874.7	14 42.99	54 00.67

Oct. 4 U Defective Illumination of N 0°.04.

MOON, 1931.

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AT TRANSIT AT GREENWICH.

Date.	Illuminated Limbs and Transit.	Apparent Right Ascension of Limb.	Var. per Hour of Long.	Sidereal Time of S. D. passing Meridian	Apparent Geocentric Declination of Centre.	Var. per Hour of Long.	Geocentric Semi-diameter.	Equatorial Horizontal Parallax.
Oct. 24	I L	^h 00 ^m 23 ^s 54.78	^s 106.93	^s 60.69	[°] + 2 ['] 50 ["] 36.5	["] + 871.8	['] 14 42.96	["] 54 00.57
24	S I U	00 45 23.35	107.94	60.96	5 44 06.0	862.0	14 43.36	54 02.04
25	I L	01 07 07.87	109.59	61.43	8 34 55.9	845.1	14 44.16	54 04.97
25	S I U	01 29 15.99	111.87	62.07	11 21 37.5	820.6	14 45.33	54 09.25
26	I L	01 51 55.10	114.75	62.89	14 02 36.0	787.8	14 46.84	54 14.82
26	N II U	02 17 19.83	118.35	63.85	+16 36 08.9	+746.2	14 48.70	54 21.63
27	II L	02 41 23.16	122.28	64.95	19 00 25.2	694.9	14 50.87	54 29.59
28	N II U	03 06 16.11	126.60	66.14	21 13 26.6	633.5	14 53.36	54 38.73
28	II L	03 32 02.34	131.14	67.38	23 13 07.2	561.4	14 56.16	54 49.02
29	N II U	03 58 43.61	135.73	68.62	24 57 16.2	478.3	14 59.29	55 00.50
29	II L	04 26 19.19	140.15	69.80	+26 23 42.2	+384.3	15 02.74	55 13.17
30	N II U	04 54 45.42	144.13	70.86	27 30 17.9	280.0	15 06.53	55 27.09
30	II L	05 23 55.57	147.42	71.74	28 15 07.5	166.8	15 10.67	55 42.28
31	N II U	05 53 39.97	149.80	72.39	28 36 33.8	+46.5	15 15.16	55 58.77
31	II L	06 23 46.69	151.12	72.76	28 33 25.6	-78.5	15 20.01	56 16.56
Nov. 1	S II U	06 54 02.58	151.33	72.85	+28 05 03.3	-205.3	15 25.21	56 35.63
1	II L	07 24 14.59	150.50	72.68	27 11 22.3	331.1	15 30.74	56 55.93
2	S II U	07 54 11.10	148.79	72.27	25 52 52.0	453.1	15 36.57	57 17.35
2	II L	08 23 42.97	146.44	71.69	24 10 32.9	568.9	15 42.67	57 39.72
3	S II U	08 52 44.30	143.75	71.01	22 05 52.2	676.4	15 48.96	58 02.82
3	II L	09 21 12.56	140.98	70.29	+19 40 37.9	-774.2	15 55.37	58 26.35
4	S II U	09 49 08.47	138.40	69.61	16 56 54.1	861.2	16 01.79	58 49.91
4	II L	10 16 35.63	136.22	69.02	13 56 57.3	936.3	16 08.10	59 13.06
5	S II U	10 43 39.94	134.61	68.57	10 43 15.0	998.6	16 14.15	59 35.27
5	II L	11 10 29.17	133.72	68.30	7 18 25.0	1047.4	16 19.78	59 55.95
6	S II U	11 37 12.38	133.62	68.24	+3 45 16.2	-1081.6	16 24.83	60 14.48
6	II L	12 03 59.57	134.39	68.40	+0 06 50.1	1100.1	16 29.13	60 30.25
7	II U	12 31 01.23	136.04	68.80	-3 33 37.9	1101.7	16 32.50	60 42.64
7	II L	12 58 27.88	138.55	69.42	7 12 37.1	1085.1	16 34.80	60 51.09
8	II U	13 26 29.58	141.86	70.25	10 46 23.2	1049.2	16 35.91	60 55.16
8	II L	13 55 15.24	145.85	71.24	-14 10 58.3	-993.2	16 35.75	60 54.56
9	II U	14 24 51.78	150.30	72.35	17 22 17.1	916.5	16 34.28	60 49.17
9	II L	14 55 23.10	154.92	73.50	20 16 12.6	819.4	16 31.52	60 39.02
10	I U	15 24 19.78	159.14	74.58	22 48 48.1	703.4	16 27.52	60 24.35
11	I L	15 56 32.92	162.89	75.50	24 56 29.5	571.0	16 22.41	60 05.60
11	I U	16 29 24.77	165.51	76.14	-26 36 21.7	-426.0	16 16.34	59 43.32
12	I L	17 02 39.30	166.61	76.43	27 46 23.6	273.5	16 09.50	59 18.21
12	I U	17 35 56.60	165.95	76.30	28 25 39.5	-119.3	16 02.09	58 51.02
13	I L	18 08 55.15	163.51	75.74	28 34 23.2	+30.9	15 54.32	58 22.51
13	N I U	18 41 14.50	159.47	74.78	28 13 53.1	172.2	15 46.40	57 53.44
14	I L	19 12 37.59	154.21	73.52	-27 26 20.0	+300.9	15 38.52	57 24.50
14	S I U	19 42 52.37	148.17	72.03	26 14 30.3	414.8	15 30.84	56 56.31
15	I L	20 11 52.16	141.78	70.43	24 41 27.3	513.1	15 23.51	56 29.40
15	S I U	20 39 35.28	135.44	68.80	22 50 15.9	596.3	15 16.64	56 04.20
16	I L	21 06 04.14	129.45	67.23	-20 43 52.8	+665.4	15 10.34	55 41.07

Oct. 25 U Defective Illumination of N 0°.24.
 Oct. 26 U Defective Illumination of I 0°.12.

Nov. 1 U Defective Illumination of N 0°.96.

AT TRANSIT AT GREENWICH.

Date.	Illum- inated Limbs and Transit.	Apparent Right Ascension of Limb.	Var. per Hour of Long.	Sidereal Time of S. D. passing Meridian	Apparent Geocentric Declination of Centre.	Var. per Hour of Long.	Geocentric Semi- diameter.	Equa- torial Hori- zontal Parallax.
Nov. 16	S I U	^h 21 ^m 31 ^s 24.20	^s 124.00	65.76	-18° 24' 58".1	+ 721".8	15° 04' 67"	55° 20' 25"
17	I L	21 55 42.80	119.22	64.44	15 55 54.6	767.1	14 59.67	55 01.02
17	S I U	22 19 08.53	115.19	63.30	13 18 46.6	802.8	14 55.39	54 46.21
18	I L	22 41 50.52	111.94	62.37	10 35 22.5	830.0	14 51.84	54 33.15
18	S I U	23 03 58.11	109.46	61.64	7 47 17.1	849.8	14 49.01	54 22.77
19	I L	23 25 40.66	107.76	61.12	- 4 55 54.9	+ 862.9	14 46.90	54 15.02
19	S I U	23 47 07.35	106.82	60.82	- 2 02 33.3	869.7	14 45.48	54 09.82
20	I L	00 08 27.20	106.62	60.74	+ 0 51 34.0	870.5	14 44.73	54 07.07
20	S I U	00 29 49.03	107.15	60.86	3 45 14.0	865.2	14 44.62	54 06.65
21	I L	00 51 21.53	108.39	61.19	6 37 12.5	853.5	14 45.09	54 08.39
21	S I U	01 13 13.14	110.33	61.72	+ 9 26 10.1	+ 835.0	14 46.11	54 12.14
22	I L	01 35 32.07	112.94	62.44	12 10 41.1	808.9	14 47.63	54 17.71
22	S I U	01 58 26.25	116.19	63.33	14 49 10.6	774.6	14 49.59	54 24.02
23	I L	02 22 02.97	120.02	64.37	17 19 53.6	731.0	14 51.95	54 33.59
23	S I U	02 46 28.67	124.34	65.53	19 40 54.2	677.4	14 54.66	54 43.52
24	I L	03 11 48.53	129.02	66.78	+21 50 06.1	+ 612.7	14 57.67	54 54.54
24	N I U	03 38 05.88	133.89	68.06	23 45 12.9	536.4	15 00.92	55 06.49
25	II L	04 07 40.21	138.91	69.32	25 23 53.7	448.4	15 04.38	55 19.21
26	N II U	04 35 54.37	143.38	70.48	26 43 47.6	348.7	15 08.02	55 32.55
26	II L	05 04 58.74	147.22	71.47	27 42 41.2	238.5	15 11.80	55 46.42
27	N II U	05 34 43.97	150.14	72.23	+28 18 38.5	+ 119.7	15 15.69	56 00.72
27	II L	06 04 57.68	151.93	72.71	28 30 09.7	- 5.3	15 19.69	56 15.37
28	N II U	06 35 25.44	152.47	72.89	28 16 20.1	133.2	15 23.76	56 30.31
28	II L	07 05 52.21	151.78	72.76	27 36 54.5	260.7	15 27.90	56 45.53
29	S II U	07 36 03.91	150.00	72.35	26 32 18.3	384.4	15 32.11	57 00.97
29	II L	08 05 48.85	147.37	71.73	+25 03 33.9	- 501.6	15 36.38	57 16.63
30	S II U	08 34 58.68	144.21	70.97	23 12 14.5	610.0	15 40.69	57 32.47
30	II L	09 03 28.88	140.82	70.13	21 00 15.9	707.9	15 45.04	57 48.45
Dec. 1	S II U	09 31 18.60	137.51	69.30	18 29 49.0	794.6	15 49.42	58 04.49
1	II L	09 58 30.27	134.52	68.52	15 43 12.9	869.4	15 53.78	58 20.51
2	S II U	10 25 09.09	132.06	67.88	+12 42 51.3	- 932.2	15 58.09	58 36.35
2	II L	10 51 22.30	130.27	67.41	9 31 10.0	982.7	16 02.31	58 51.81
3	S II U	11 17 18.72	129.27	67.13	6 10 36.7	1020.8	16 06.35	59 06.67
3	II L	11 43 08.28	129.14	67.07	+ 2 43 42.4	1046.1	16 10.15	59 20.61
4	S II U	12 09 01.63	129.91	67.26	- 0 46 55.9	1058.0	16 13.62	59 33.32
4	II L	12 35 09.85	131.61	67.68	- 4 18 32.8	-1055.7	16 16.64	59 44.41
5	S II U	13 01 44.01	134.23	68.34	7 48 12.2	1038.2	16 19.11	59 53.48
5	II L	13 28 54.89	137.72	69.22	11 12 44.0	1004.3	16 20.92	60 00.13
6	S II U	13 56 52.30	141.97	70.28	14 28 44.0	952.7	16 21.98	60 04.00
6	II L	14 25 44.33	146.79	71.47	17 32 34.4	882.5	16 22.18	60 04.76
7	II U	14 55 36.34	151.91	72.73	-20 20 28.1	- 793.2	16 21.47	60 02.14
7	II L	15 26 29.82	156.96	73.95	22 48 36.6	685.1	16 19.80	59 56.02
8	II U	15 58 21.18	161.47	75.03	24 53 21.7	559.7	16 17.17	59 46.35
8	II L	16 31 00.97	164.94	75.87	-26 31 31.9	- 419.9	16 13.60	59 33.25

Nov. 23 U Defective Illumination of N 0°.47.

Nov. 24 U Defective Illumination of II 0°.21.

Nov. 24 U Defective Illumination of S 1°.03.

Nov. 28 U Defective Illumination of S 0°.60.

MOON, 1931.

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AT TRANSIT AT GREENWICH.

Date.	Illuminated Limbs and Transit.	Apparent Right Ascension of Limb.	Var. per Hour of Long.	Sidereal Time of S. D. passing Meridian	Apparent Geocentric Declination of Centre.	Var. per Hour of Long.	Geocentric Semi-diameter.	Equatorial Horizontal Parallax.
Dec. 9	II U	^{h m s} 17 04 13.84	^s 166.91	^s 76.34	^{° ′ ″} -27 40 39.6	[″] -270.1	16 09.16	59 16.95
10	I L	17 35 06.83	167.08	76.39	28 19 17.5	-116.0	16 03.94	58 57.82
10	I U	18 08 23.50	165.37	75.98	28 27 09.3	+36.5	15 58.09	58 36.33
11	I L	18 41 08.50	161.85	75.15	28 05 10.0	181.6	15 51.74	58 13.02
11	I U	19 13 02.10	156.87	73.96	27 15 17.2	314.8	15 45.05	57 48.48
12	I L	19 43 49.46	150.90	72.51	-26 00 14.2	+432.9	15 38.20	57 23.32
12	I U	20 13 21.57	144.41	70.90	24 23 11.5	534.7	15 31.33	56 58.12
13	I L	20 41 35.04	137.86	69.25	22 27 27.4	620.0	15 24.61	56 33.42
13	S I U	21 08 31.18	131.58	67.63	20 16 14.5	689.7	15 18.15	56 09.74
14	I L	21 34 14.84	125.81	66.12	17 52 30.6	745.4	15 12.09	55 47.49
14	S I U	21 58 53.30	120.72	64.76	-15 18 54.0	+788.8	15 06.52	55 27.06
15	I L	22 22 35.26	116.40	63.58	12 37 42.3	821.5	15 01.53	55 08.74
15	S I U	22 45 30.18	112.89	62.61	9 50 54.0	845.1	14 57.19	54 52.79
16	I L	23 07 47.85	110.19	61.85	7 00 10.9	860.9	14 53.53	54 39.38
16	S I U	23 29 38.05	108.31	61.32	4 07 01.5	869.7	14 50.61	54 28.65
17	I L	23 51 10.46	107.23	61.01	-1 12 44.4	+872.2	14 48.43	54 20.66
17	S I U	00 12 34.64	106.93	60.92	+1 41 28.1	868.9	14 47.02	54 15.47
18	I L	00 33 59.92	107.41	61.05	4 34 26.7	859.9	14 46.36	54 13.04
18	S I U	00 55 35.51	108.65	61.40	7 25 01.3	844.9	14 46.44	54 13.33
19	I L	01 17 30.49	110.64	61.94	10 11 58.7	823.6	14 47.23	54 16.25
19	S I U	01 39 53.65	113.35	62.70	+12 53 58.8	+795.2	14 48.71	54 21.68
20	I L	02 02 53.53	116.75	63.63	15 29 32.5	759.0	14 50.83	54 29.44
20	S I U	02 26 38.12	120.79	64.72	17 56 59.4	713.9	14 53.53	54 39.36
21	I L	02 51 14.60	125.38	65.94	20 14 26.1	658.8	14 56.76	54 51.22
21	S I U	03 16 48.74	130.37	67.25	22 19 46.2	592.6	15 00.45	55 04.75
22	I L	03 43 24.41	135.59	68.59	+24 10 41.1	+514.5	15 04.52	55 19.69
22	S I U	04 11 02.74	140.77	69.90	25 44 43.7	423.9	15 08.89	55 35.75
23	I L	04 39 41.53	145.61	71.11	26 59 24.3	320.9	15 13.49	55 52.62
23	N I U	05 09 14.61	149.76	72.13	27 52 20.2	206.6	15 18.22	56 09.98
24	I L	05 39 31.75	152.90	72.89	28 21 26.1	+83.0	15 23.00	56 27.53
25	N II U	06 12 45.92	154.82	73.35	+28 25 06.1	-47.1	15 27.75	56 44.96
25	II L	06 43 47.81	155.24	73.47	28 02 24.0	180.0	15 32.39	57 02.01
26	N II U	07 14 46.34	154.28	73.25	27 13 10.1	311.7	15 36.87	57 18.43
26	II L	07 45 25.85	152.12	72.74	25 58 02.4	438.4	15 41.11	57 34.02
27	S II U	08 15 33.56	149.04	72.00	24 18 22.7	556.6	15 45.09	57 48.61
27	II L	08 45 00.52	145.39	71.11	+22 16 08.6	-663.8	15 48.77	58 02.11
28	S II U	09 13 42.06	141.53	70.16	19 53 42.4	758.3	15 52.13	58 14.46
28	II L	09 41 37.59	137.77	69.22	17 13 42.8	839.3	15 55.17	58 25.63
29	S II U	10 08 50.00	134.38	68.37	14 18 55.0	906.4	15 57.90	58 35.62
29	II L	10 35 24.94	131.56	67.65	11 12 05.5	959.6	16 00.31	58 44.47
30	S II U	11 01 30.21	129.45	67.11	+7 55 58.8	-999.3	16 02.42	58 52.21
30	II L	11 27 15.00	128.15	66.78	4 33 15.8	1025.7	16 04.23	58 58.87
31	S II U	11 52 49.50	127.74	66.68	+1 06 34.4	1039.0	16 05.76	59 04.48
31	II L	12 18 24.49	128.24	66.82	-2 21 28.7	1039.3	16 07.00	59 09.04
32	S II U	12 44 11.03	129.67	67.20	-5 48 15.2	-1026.2	16 07.95	59 12.51

Dec. 22 U Defective Illumination of N 0°.05.
 Dec. 25 U Defective Illumination of I 0°.00.

Dec. 26 U Defective Illumination of S 0°.98.
 Dec. 27 U Defective Illumination of N 0°.63.

Date.	Heliocentric		Logarithm of Radius Vector.	Date.	Heliocentric		Logarithm of Radius Vector.
	Longitude.	Latitude.			Longitude.	Latitude.	
Jan. 1	72° 42' 19".7	+2° 59' 35".8	9.487 9898	Feb. 16	260° 13' 10".9	-3° 47' 50".7	9.668 7542
2	79 01 30.0	3 40 25.7	.487 9409	17	262 58 26.1	4 04 34.7	.668 2438
3	85 20 31.4	4 18 31.1	.488 7971	18	265 44 17.4	4 20 47.7	.667 4730
4	91 37 53.0	4 53 16.5	.490 5391	19	268 30 57.1	4 36 28.2	.666 4413
5	97 52 06.1	5 24 13.2	.493 1286	20	271 18 37.8	4 51 34.6	.665 1478
6	104 01 47.3	+5 51 00.1	9.496 5106	21	274 07 32.2	-5 06 05.0	9.663 5918
7	110 05 40.7	6 13 23.8	.500 6161	22	276 57 53.1	5 19 57.6	.661 7725
8	116 02 40.2	6 31 18.7	.505 3666	23	279 49 53.8	5 33 10.2	.659 6889
9	121 51 50.4	6 44 46.6	.510 6768	24	282 43 48.0	5 45 40.5	.657 3400
10	127 32 27.6	6 53 55.2	.516 4589	25	285 39 49.8	5 57 25.7	.654 7249
11	133 03 59.4	+6 58 57.3	9.522 6257	26	288 38 13.5	-6 08 22.9	9.651 8424
12	138 26 04.5	7 00 09.2	.529 0930	27	291 39 14.0	6 18 28.9	.648 6919
13	143 38 31.7	6 57 49.8	.535 7811	28	294 43 06.9	6 27 40.3	.645 2729
14	148 41 18.7	6 52 19.1	.542 6170	Mar. 1	297 50 08.3	6 35 53.1	.641 5852
15	153 34 30.5	6 43 57.5	.549 5344	2	301 00 34.9	6 43 03.1	.637 6288
16	158 18 18.1	+6 33 05.3	9.556 4743	3	304 14 44.1	-6 49 05.7	9.633 4045
17	162 52 57.7	6 20 02.0	.563 3850	4	307 32 53.9	6 53 55.6	.628 9138
18	167 18 49.2	6 05 05.5	.570 2218	5	310 55 23.1	6 57 27.4	.624 1593
19	171 36 15.0	5 48 32.5	.576 9463	6	314 22 31.2	6 59 35.0	.619 1446
20	175 45 39.3	5 30 38.4	.583 5262	7	317 54 38.6	7 00 11.9	.613 8748
21	179 47 27.5	+5 11 36.9	9.589 9346	8	321 32 05.9	-6 59 11.1	9.608 3566
22	183 42 05.3	4 51 40.0	.596 1489	9	325 15 14.6	6 56 25.1	.602 5992
23	187 29 58.8	4 30 58.6	.602 1511	10	329 04 26.8	6 51 46.1	.596 6139
24	191 11 33.7	4 09 42.1	.607 9265	11	333 00 04.8	6 45 05.8	.590 4150
25	194 47 14.8	3 47 58.9	.613 4633	12	337 02 31.2	6 36 15.7	.584 0207
26	198 17 26.6	+3 25 56.0	9.618 7523	13	341 12 08.4	-6 25 07.0	9.577 4530
27	201 42 32.5	3 03 39.8	.623 7865	14	345 29 18.5	6 11 31.3	.570 7385
28	205 02 55.2	2 41 15.5	.628 5610	15	349 54 22.6	5 55 20.2	.563 9090
29	208 18 56.3	2 18 48.0	.633 0719	16	354 27 40.7	5 36 26.2	.557 0025
30	211 30 56.5	1 56 21.1	.637 3166	17	359 09 30.8	5 14 42.8	.550 0630
31	214 39 15.7	+1 33 58.2	9.641 2935	18	4 00 08.1	-4 50 05.0	9.543 1419
Feb. 1	217 44 12.8	1 11 42.5	.645 0018	19	8 59 44.2	4 22 30.1	.536 2976
2	220 46 05.8	0 49 36.4	.648 4414	20	14 08 26.4	3 51 58.2	.529 5957
3	223 45 11.9	0 27 42.1	.651 6123	21	19 26 16.4	3 18 33.1	.523 1088
4	226 41 47.7	+0 06 01.7	.654 5150	22	24 53 09.0	2 42 22.6	.516 9160
5	229 36 09.0	-0 15 23.2	9.657 1505	23	30 28 51.3	-2 03 39.9	9.511 1015
6	232 28 31.0	0 36 31.0	.659 5196	24	36 13 01.6	1 22 43.6	.505 7522
7	235 19 08.3	0 57 20.4	.661 6233	25	42 05 08.3	-0 39 57.9	.500 9561
8	238 08 15.1	1 17 50.2	.663 4626	26	48 04 29.3	+0 04 07.1	.496 7985
9	240 56 05.2	1 37 59.2	.665 0386	27	54 10 12.1	0 48 55.9	.493 3586
10	243 42 51.8	-1 57 46.3	9.666 3521	28	60 21 13.6	+1 33 48.7	9.490 7065
11	246 28 47.9	2 17 10.3	.667 4038	29	66 36 21.2	2 18 02.6	.488 8982
12	249 14 06.3	2 36 10.8	.668 1944	30	72 54 14.2	3 00 53.8	.487 9734
13	251 58 59.4	2 54 46.1	.668 7245	31	79 13 25.7	3 41 39.2	.487 9528
14	254 43 39.7	3 12 55.3	.668 9943	Apr. 1	85 32 25.4	4 19 38.9	.488 8370
15	257 28 19.5	-3 30 37.2	9.669 0043	2	91 49 42.5	+4 54 17.6	9.490 6061
16	260 13 10.9	-3 47 50.7	9.668 7542	3	98 03 48.6	+5 25 06.9	9.493 2212

Date.	Heliocentric		Logarithm of Radius Vector.	Date.	Heliocentric		Logarithm of Radius Vector.
	Longitude.	Latitude.			Longitude.	Latitude.	
Apr. 1	85° 32' 25".4	+4° 19' 38".9	9.488 8370	May 17	265° 49' 36".8	-4° 21' 17".4	9.667 4452
2	91 49 42.5	4 54 17.6	.490 6061	18	268 36 18.3	4 36 56.8	.666 4053
3	98 03 48.6	5 25 06.9	.493 2212	19	271 24 01.0	4 52 02.1	.665 1037
4	104 13 20.1	5 51 45.8	.496 6268	20	274 12 57.8	5 06 31.4	.663 5397
5	110 17 01.7	6 14 01.2	.500 7537	21	277 03 21.6	5 20 22.9	.661 7123
6	116 13 47.4	+6 31 47.8	9.505 5228	22	279 55 25.7	-5 33 34.2	9.659 6205
7	122 02 42.2	6 45 07.5	.510 8491	23	282 49 23.6	5 46 03.0	.657 2634
8	127 43 02.9	6 54 08.2	.516 6445	24	285 45 29.5	5 57 46.7	.654 6399
9	133 14 17.4	6 59 02.9	.522 8219	25	288 43 57.8	6 08 42.4	.651 7492
10	138 36 04.8	7 00 08.0	.529 2973	26	291 45 03.4	6 18 46.9	.648 5905
11	143 48 14.0	+6 57 42.3	9.535 9913	27	294 49 01.9	-6 27 56.6	9.645 1632
12	148 50 42.9	6 52 06.0	.542 8306	28	297 56 09.4	6 36 07.5	.641 4671
13	153 43 36.9	6 43 39.5	.549 7494	29	301 06 42.6	6 43 15.4	.637 5023
14	158 27 07.3	6 32 43.0	.556 6892	30	304 20 58.9	6 49 15.8	.633 2697
15	163 01 30.3	6 19 35.8	.563 5984	31	307 39 16.4	6 54 03.4	.628 7708
16	167 27 05.7	+6 04 36.0	9.570 4321	June 1	311 01 53.9	-6 57 32.6	9.624 0082
17	171 44 16.1	5 48 00.4	.577 1525	2	314 29 11.0	6 59 37.5	.618 9855
18	175 53 25.9	5 30 04.0	.583 7274	3	318 01 27.9	7 00 11.5	.613 7079
19	179 55 00.4	5 11 00.6	.590 1301	4	321 39 05.5	6 59 07.5	.608 1822
20	183 49 25.3	4 51 02.1	.596 3382	5	325 22 25.1	6 56 18.2	.602 4174
21	187 37 06.7	+4 30 19.5	9.602 3335	6	329 11 48.9	-6 51 35.6	9.596 4252
22	191 18 30.2	4 09 02.1	.608 1017	7	333 07 39.2	6 44 51.3	.590 2201
23	194 54 00.7	3 47 18.2	.613 6309	8	337 10 18.5	6 35 57.0	.583 8201
24	198 24 02.6	3 25 14.8	.618 9122	9	341 20 09.4	6 24 44.0	.577 2473
25	201 48 59.4	3 02 58.2	.623 9386	10	345 37 33.7	6 11 03.7	.570 5288
26	205 09 13.7	+2 40 33.8	9.628 7050	11	350 02 52.7	-5 54 47.7	9.563 6964
27	208 25 07.1	2 18 06.3	.633 2076	12	354 36 26.4	5 35 48.5	.556 7881
28	211 37 00.2	1 55 39.4	.637 4439	13	359 18 32.6	5 13 59.7	.549 8483
29	214 45 12.9	1 33 16.7	.641 4124	14	4 09 26.5	4 49 16.5	.542 9286
30	217 50 04.0	1 11 01.2	.645 1123	15	9 09 19.5	4 21 36.1	.536 0875
May 1	220 51 51.5	+0 48 55.5	9.648 5435	16	14 18 18.7	-3 50 58.7	9.529 3910
2	223 50 52.7	0 27 01.6	.651 7060	17	19 36 25.6	3 17 28.3	.522 9121
3	226 47 24.1	+0 05 21.6	.654 6005	18	25 03 34.8	2 41 13.0	.516 7298
4	229 41 41.5	-0 16 02.8	.657 2277	19	30 39 33.2	2 02 25.8	.510 9282
5	232 34 00.0	0 37 10.1	.659 5886	20	36 23 58.8	1 21 25.7	.505 5947
6	235 24 34.4	-0 57 58.9	9.661 6841	21	42 16 19.6	-0 38 37.1	9.500 8171
7	238 13 38.7	1 18 28.0	.663 5152	22	48 15 53.3	+0 05 29.8	.496 6806
8	241 01 26.5	1 38 36.4	.665 0831	23	54 21 47.0	0 50 19.4	.493 2643
9	243 48 11.4	1 58 22.8	.666 3886	24	60 32 57.2	1 35 11.6	.490 6375
10	246 34 06.1	2 17 46.3	.667 4321	25	66 48 11.2	2 19 23.6	.488 8560
11	249 19 23.5	-2 36 45.8	9.668 2146	26	73 06 08.0	+3 02 11.6	9.487 9590
12	252 04 16.1	2 55 20.2	.668 7367	27	79 25 20.5	3 42 52.5	.487 9665
13	254 48 56.3	3 13 28.5	.668 9986	28	85 44 18.5	4 20 46.4	.488 8784
14	257 33 36.2	3 31 09.7	.669 0004	29	92 01 31.0	4 55 18.4	.490 6744
15	260 18 28.1	3 48 22.4	.668 7423	30	98 15 29.7	5 26 00.3	.493 3152
16	263 03 44.2	-4 05 05.4	9.668 2240	July 1	104 24 51.5	+5 52 31.2	9.496 7443
17	265 49 36.8	-4 21 17.4	9.667 4452	2	110 28 21.2	+6 14 38.3	9.500 8922

Date.	Heliocentric		Logarithm of Radius Vector.	Date.	Heliocentric		Logarithm of Radius Vector.
	Longitude.	Latitude.			Longitude.	Latitude.	
July 1	104 24 51.5	+5 52 31.2	9.496 7443	Aug. 16	274 18 24.0	-5 06 57.9	9.663 4863
2	110 28 21.2	6 14 38.3	.500 8922	17	277 08 50.7	5 20 48.0	.661 6507
3	116 24 53.1	6 32 16.5	.505 6798	18	280 00 58.1	5 33 58.1	.659 5508
4	122 13 32.6	6 45 28.0	.511 0218	19	282 54 59.9	5 46 25.6	.657 1854
5	127 53 36.7	6 54 21.0	.516 8305	20	285 51 10.0	5 58 07.9	.654 5537
6	133 24 33.9	+6 59 08.3	9.523 0184	21	288 49 43.0	-6 09 02.1	9.651 6549
7	138 46 03.5	7 00 06.5	.529 5014	22	291 50 53.8	6 19 04.9	.648 4880
8	143 57 54.7	6 57 34.7	.536 2008	23	294 54 57.9	6 28 12.7	.645 0524
9	149 00 05.8	6 51 52.8	.543 0438	24	298 02 11.5	6 36 21.7	.641 3479
10	153 52 42.1	6 43 21.3	.549 9644	25	301 12 51.4	6 43 27.7	.637 3749
11	158 35 55.3	+6 32 20.5	9.556 9040	26	304 27 15.0	-6 49 25.9	9.633 1341
12	163 10 01.6	6 19 09.5	.563 8114	27	307 45 40.3	6 54 11.2	.628 6272
13	167 35 21.0	6 04 06.6	.570 6421	28	311 08 26.2	6 57 37.9	.623 8565
14	171 52 16.2	5 47 28.2	.577 3584	29	314 35 52.4	6 59 39.9	.618 8261
15	176 01 11.5	5 29 29.5	.583 9284	30	318 08 18.9	7 00 10.9	.613 5408
16	180 02 32.2	+5 10 24.2	9.590 3254	31	321 46 06.7	-6 59 03.9	9.608 0076
17	183 56 44.3	4 50 24.3	.596 5271	Sept. 1	325 29 37.3	6 56 11.2	.602 2359
18	187 44 13.7	4 29 40.5	.602 5156	2	329 19 12.7	6 51 24.9	.596 2371
19	191 25 25.8	4 08 22.2	.608 2765	3	333 15 15.4	6 44 36.8	.590 0257
20	195 00 45.8	3 46 37.5	.613 7981	4	337 18 07.7	6 35 38.3	.583 6201
21	198 30 38.0	+3 24 33.7	9.619 0714	5	341 28 12.2	-6 24 20.8	9.577 0426
22	201 55 25.7	3 02 16.8	.624 0897	6	345 45 50.9	6 10 35.7	.570 3202
23	205 15 31.6	2 39 52.2	.628 8480	7	350 11 24.9	5 54 14.8	.563 4851
24	208 31 17.2	2 17 24.5	.633 3424	8	354 45 14.1	5 35 10.5	.556 5755
25	211 43 03.2	1.54 57.8	.637 5705	9	359 27 36.2	5 13 16.4	.549 6359
26	214 51 09.4	+1 32 35.3	9.641 5308	10	4 18 46.3	-4 48 27.7	9.542 7180
27	217 55 54.6	1 10 20.0	.645 2224	11	9 18 56.0	4 20 41.8	.535 8807
28	220 57 36.8	0 48 14.6	.648 6452	12	14 28 12.0	3 49 59.0	.529 1902
29	223 56 33.1	0 26 21.2	.651 7994	13	19 46 35.5	3 16 23.4	.522 7195
30	226 53 00.2	+0 04 41.7	.654 6855	14	25 14 01.1	2 40 03.2	.516 5479
31	229 47 13.7	-0 16 42.3	9.657 3045	15	30 50 15.3	-2 01 11.7	9.510 7597
Aug. 1	232 39 28.8	0 37 49.0	.659 6574	16	36 34 55.7	1 20 07.8	.505 4423
2	235 30 00.1	0 58 37.3	.661 7446	17	42 27 30.2	-0 37 16.2	.500 6834
3	238 19 01.8	1 19 05.8	.663 5674	18	48 27 16.1	+0 06 52.5	.496 5681
4	241 06 47.6	1 39 13.5	.665 1271	19	54 33 20.2	0 51 42.7	.493 1753
5	243 53 30.7	-1 58 59.3	9.666 4242	20	60 44 38.7	+1 36 34.2	9.490 5739
6	246 39 24.1	2 18 22.0	.667 4596	21	66 59 58.5	2 20 44.3	.488 8191
7	249 24 40.6	2 37 20.7	.668 2340	22	73 17 58.5	3 03 28.9	.487 9498
8	252 09 32.7	2 55 54.4	.668 7479	23	79 37 11.5	3 44 05.1	.487 9852
9	254 54 12.7	3 14 01.9	.669 0017	24	85 56 07.2	4 21 53.3	.488 9246
10	257 38 52.9	-3 31 42.1	9.668 9956	25	92 13 14.7	+4 56 18.7	9.490 7471
11	260 23 45.4	3 48 53.9	.668 7295	26	98 27 05.8	5 26 53.1	.493 4127
12	263 09 02.5	4 05 36.0	.668 2032	27	104 36 17.6	5 53 15.9	.496 8646
13	265 54 56.4	4 21 47.0	.667 4162	28	110 39 35.0	6 15 14.7	.501 0331
14	268 41 39.6	4 37 25.4	.666 3682	29	116 35 52.9	6 32 44.7	.505 8387
15	271 29 24.6	-4 52 29.7	9.665 0585	30	122 24 17.0	+6 45 48.2	9.511 1960
16	274 18 24.0	-5 06 57.9	9.663 4863	Oct. 1	128 04 04.6	+6 54 33.3	9.517 0173

Date.	Heliocentric		Logarithm of Radius Vector.	Date.	Heliocentric		Logarithm of Radius Vector.
	Longitude.	Latitude.			Longitude.	Latitude.	
Oct. 1	128° 04' 04".6	+6° 54' 33".3	9.517 0173	Nov. 16	285° 56' 48".4	-5° 58' 28".8	9.654 4720
2	133 34 44.4	6 59 13.4	.523 2153	17	288 55 25.9	6 09 21.4	.651 5653
3	138 55 56.2	7 00 05.0	.529 7060	18	291 56 41.6	6 19 22.5	.648 3905
4	144 07 29.5	6 57 27.0	.536 4106	19	295 00 51.1	6 28 28.7	.644 9471
5	149 09 22.8	6 51 39.5	.543 2566	20	298 08 10.6	6 36 35.9	.641 2347
6	154 01 41.6	+6 43 03.2	9.550 1782	21	301 18 56.9	-6 43 39.8	9.637 2539
7	158 44 37.7	6 31 58.1	.557 1172	22	304 33 27.4	6 49 35.8	.633 0055
8	163 18 27.5	6 18 43.5	.564 0226	23	307 52 00.1	6 54 18.7	.628 4909
9	167 43 31.2	6 03 37.4	.570 8502	24	311 14 54.0	6 57 42.9	.623 7127
10	172 00 11.4	5 46 56.3	.577 5624	25	314 42 28.7	6 59 42.4	.618 6747
11	176 08 52.4	+5 28 55.4	9.584 1273	26	318 15 04.3	-7 00 10.4	9.613 3821
12	180 09 59.6	5 09 48.2	.590 5182	27	321 53 01.9	6 59 00.2	.607 8418
13	184 03 59.0	4 49 46.8	.596 7134	28	325 36 42.9	6 56 04.2	.602 0633
14	187 51 16.5	4 29 01.7	.602 6951	29	329 26 29.3	6 51 14.3	.596 0581
15	191 32 17.6	4 07 42.4	.608 4485	30	333 22 43.6	6 44 22.3	.589 8410
16	195 07 27.2	+3 45 57.1	9.613 9625	Dec. 1	337 25 48.3	-6 35 19.8	9.583 4302
17	198 37 09.7	3 23 52.8	.619 2280	2	341 36 05.7	6 23 57.9	.576 8482
18	202 01 48.6	3 01 35.5	.624 2384	3	345 53 58.0	6 10 08.2	.570 1221
19	205 21 46.3	2 39 10.8	.628 9885	4	350 19 46.2	5 53 42.5	.563 2843
20	208 37 24.4	2 16 43.1	.633 4747	5	354 53 50.1	5 34 33.2	.556 3732
21	211 49 03.5	+1 54 16.4	9.637 6945	6	359 36 27.4	-5 12 34.0	9.549 4337
22	214 57 03.4	1 31 54.1	.641 6466	7	4 27 53.1	4 47 39.9	.542 5174
23	218 01 42.8	1 09 39.1	.645 3300	8	9 28 18.5	4 19 48.7	.535 6834
24	221 03 19.7	0 47 34.0	.648 7445	9	14 37 50.5	3 49 00.8	.528 9983
25	224 02 11.3	0 25 40.9	.651 8905	10	19 56 29.9	3 15 20.1	.522 5352
26	226 58 34.1	+0 04 01.9	9.654 7685	11	25 24 11.0	-2 38 55.1	9.516 3737
27	229 52 43.8	-0 17 21.5	.657 3793	12	31 00 40.2	1 59 59.4	.510 5982
28	232 44 55.6	0 38 27.8	.659 7239	13	36 45 35.0	1 18 52.0	.505 2960
29	235 35 24.1	0 59 15.4	.661 8031	14	42 38 22.7	-0 35 57.7	.500 5547
30	238 24 23.4	1 19 43.4	.663 6181	15	48 38 20.3	+0 08 12.8	.496 4593
31	241 12 07.2	-1 39 50.4	9.665 1698	16	54 44 34.5	+0 53 03.6	9.493 0887
Nov. 1	243 58 48.7	1 59 35.4	.666 4591	17	60 56 01.0	1 37 54.5	.490 5114
2	246 44 40.8	2 18 57.5	.667 4867	18	67 11 26.6	2 22 02.6	.488 7821
3	249 29 56.4	2 37 55.5	.668 2533	19	73 29 30.0	3 04 43.9	.487 9389
4	252 14 48.0	2 56 28.3	.668 7594	20	79 48 43.8	3 45 15.8	.488 0008
5	254 59 27.9	-3 14 35.0	9.669 0055	21	86 07 37.5	+4 22 58.4	9.488 9665
6	257 44 08.3	3 32 14.4	.668 9915	22	92 24 40.4	4 57 17.1	.490 8143
7	260 29 01.4	3 49 25.3	.668 7175	23	98 38 24.4	5 27 44.2	.493 5036
8	263 14 19.5	4 06 06.5	.668 1834	24	104 47 26.7	5 53 59.3	.496 9776
9	266 00 14.9	4 22 16.6	.667 3887	25	110 50 32.7	6 15 50.1	.501 1659
10	268 46 59.8	-4 37 53.9	9.666 3330	26	116 46 37.4	+6 33 12.1	9.505 9887
11	271 34 46.7	4 52 57.0	.665 0156	27	122 34 47.0	6 46 07.7	.511 3608
12	274 23 48.5	5 07 24.1	.663 4356	28	128 14 18.9	6 54 45.3	.517 1942
13	277 14 18.1	5 21 13.1	.661 5923	29	133 44 42.3	6 59 18.2	.523 4019
14	280 06 28.8	5 34 21.8	.659 4846	30	139 05 37.3	7 00 03.1	.529 9000
15	283 00 34.2	-5 46 48.0	9.657 1115	31	144 16 53.7	+6 57 19.1	9.536 6096
16	285 56 48.4	-5 58 28.8	9.654 4720	32	149 18 30.0	+6 51 26.3	9.543 4586

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Semi- diam- eter.	Hor. Par.	Log of True Dist. from the Earth.	Meri- dian Passage
Jan. 1	^{h m s} 19 28 45.72	^s - 8.754	^{° ' "} -20 35 48.2	["] + 30.75	["] 4.62	["] 12.17	9.859 1518	^{h m} 12 46.0
2	19 24 53.32	10.575	20 24 15.5	26.95	4.72	12.44	.849 5800	12 37.8
3	19 20 20.21	12.133	20 14 15.3	23.06	4.81	12.68	.841 4151	12 29.1
4	19 15 13.72	13.344	20 05 48.8	19.16	4.89	12.87	.834 8836	12 19.9
5	19 09 43.01	14.140	19 58 55.4	15.30	4.94	13.01	.830 1632	12 10.3
6	19 03 58.57	-14.484	-19 53 33.6	+ 11.53	4.97	13.10	9.827 3649	12 00.7
7	18 58 11.46	14.366	19 49 41.5	7.83	4.98	13.12	.826 5234	11 51.1
8	18 52 32.54	13.808	19 47 17.1	4.22	4.97	13.09	.827 5956	11 41.7
9	18 47 11.74	12.867	19 46 18.3	+ 0.70	4.94	13.00	.830 4671	11 32.6
10	18 42 17.47	11.610	19 46 42.8	- 2.71	4.89	12.87	.834 9673	11 24.1
11	18 37 56.31	-10.122	-19 48 27.5	- 5.98	4.82	12.69	9.840 8869	11 16.1
12	18 34 12.84	8.482	19 51 28.1	9.04	4.74	12.49	.847 9976	11 08.8
13	18 31 09.83	6.762	19 55 39.2	11.84	4.66	12.26	.856 0684	11 02.2
14	18 28 48.40	5.025	20 00 54.0	14.34	4.56	12.01	.864 8788	10 56.2
15	18 27 08.39	3.317	20 07 04.5	16.48	4.47	11.76	.874 2276	10 50.9
16	18 26 08.66	- 1.674	-20 14 01.7	- 18.23	4.37	11.50	9.883 9380	10 46.3
17	18 25 47.36	- 0.117	20 21 36.2	19.58	4.27	11.24	.893 8596	10 42.3
18	18 26 02.23	+ 1.339	20 29 38.4	20.54	4.17	10.98	.903 8675	10 38.8
19	18 26 50.77	2.688	20 37 58.8	21.10	4.07	10.73	.913 8606	10 36.0
20	18 28 10.39	3.929	20 46 27.9	21.27	3.98	10.49	.923 7588	10 33.6
21	18 29 58.51	+ 5.064	-20 54 56.9	- 21.09	3.90	10.26	9.933 4999	10 31.6
22	18 32 12.67	6.100	21 03 17.5	20.58	3.81	10.03	.943 0374	10 30.1
23	18 34 50.54	7.041	21 11 22.2	19.77	3.73	9.82	.952 3371	10 28.9
24	18 37 49.94	7.895	21 19 03.9	18.66	3.65	9.62	.961 3750	10 28.1
25	18 41 08.88	8.670	21 26 16.4	17.32	3.58	9.43	.970 1354	10 27.6
26	18 44 45.53	+ 9.373	-21 32 53.7	- 15.75	3.51	9.24	9.978 6083	10 27.4
27	18 48 38.23	10.009	21 38 50.7	13.97	3.44	9.07	.986 7890	10 27.5
28	18 52 45.46	10.585	21 44 02.9	12.02	3.38	8.91	9.994 6776	10 27.7
29	18 57 05.88	11.108	21 48 26.2	9.90	3.32	8.75	0.002 2760	10 28.2
30	19 01 38.27	11.583	21 51 56.9	7.64	3.27	8.61	.009 5885	10 28.9
Feb. 1	19 06 21.52	+12.015	-21 54 31.8	- 5.25	3.22	8.47	0.016 6211	10 29.8
2	19 11 14.65	12.407	21 56 07.8	2.74	3.17	8.34	.023 3806	10 30.8
3	19 16 16.76	12.763	21 56 42.5	- 0.14	3.12	8.21	.029 8750	10 31.9
4	19 21 27.05	13.089	21 56 13.6	+ 2.55	3.08	8.10	.036 1121	10 33.2
5	19 26 44.80	13.386	21 54 39.1	5.33	3.03	7.99	.042 1002	10 34.6
6	19 32 09.36	+13.656	-21 51 57.0	+ 8.18	2.99	7.88	0.047 8477	10 36.1
7	19 37 40.12	13.903	21 48 06.0	11.08	2.95	7.78	.053 3630	10 37.7
8	19 43 16.56	14.130	21 43 04.5	14.05	2.92	7.69	.058 6536	10 39.5
9	19 48 58.20	14.337	21 36 51.1	17.07	2.89	7.60	.063 7275	10 41.2
10	19 54 44.59	14.526	21 29 24.8	20.13	2.85	7.51	.068 5923	10 43.1
11	20 00 35.33	+14.699	-21 20 44.7	+ 23.22	2.82	7.43	0.073 2548	10 45.0
12	20 06 30.05	14.859	21 10 50.0	26.35	2.80	7.36	.077 7220	10 47.0
13	20 12 28.44	15.005	20 59 39.7	29.51	2.77	7.29	.082 0000	10 49.1
14	20 18 30.20	15.140	20 47 13.2	32.70	2.74	7.22	.086 0949	10 51.2
15	20 24 35.04	15.263	20 33 30.1	35.90	2.72	7.15	.090 0124	10 53.4
16	20 30 42.74	+15.377	-20 18 29.7	+ 39.14	2.69	7.09	0.093 7573	10 55.6
17	20 36 53.08	+15.483	-20 02 11.5	+ 42.38	2.67	7.03	0.097 3344	10 57.8

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Semi- diam- eter.	Hor. Par.	Log of True Dist. from the Earth.	Meri- dian Passage
	^h ^m ^s	^s	[°] ['] ["]	["]	["]	["]		^h ^m
Feb. 16	20 36 53.08	+15.483	-20 02 11.5	+42.38	2.67	7.03	0.097 3344	10 57.8
17	20 43 05.87	15.581	19 44 35.4	45.64	2.65	6.98	100 7481	11 00.1
18	20 49 20.91	15.671	19 25 40.8	48.91	2.63	6.92	104 0020	11 02.5
19	20 55 38.07	15.757	19 05 27.5	52.20	2.61	6.88	107 0993	11 04.8
20	21 01 57.21	15.837	18 43 55.3	55.49	2.59	6.83	110 0432	11 07.2
21	21 08 18.22	+15.913	-18 21 04.0	+58.79	2.58	6.79	0.112 8358	11 09.6
22	21 14 41.00	15.985	17 56 53.4	62.09	2.56	6.75	115 4793	11 12.1
23	21 21 05.47	16.054	17 31 23.4	65.41	2.55	6.71	117 9748	11 14.6
24	21 27 31.56	16.120	17 04 33.9	68.72	2.53	6.67	120 3233	11 17.1
25	21 33 59.21	16.185	16 36 24.8	72.04	2.52	6.64	122 5253	11 19.6
26	21 40 28.40	+16.248	-16 06 56.1	+75.35	2.51	6.61	0.124 5802	11 22.2
27	21 46 59.10	16.310	15 36 07.7	78.67	2.50	6.58	126 4874	11 24.8
28	21 53 31.30	16.373	15 03 59.7	81.99	2.49	6.55	128 2454	11 27.4
Mar. 1	22 00 05.01	16.436	14 30 32.3	85.30	2.48	6.53	129 8522	11 30.0
2	22 06 40.24	16.500	13 55 45.6	88.60	2.47	6.50	131 3048	11 32.7
3	22 13 17.01	+16.565	-13 19 39.6	+91.90	2.46	6.48	0.132 5995	11 35.4
4	22 19 55.35	16.631	12 42 14.5	95.18	2.46	6.47	133 7319	11 38.1
5	22 26 35.32	16.700	12 03 30.9	98.45	2.45	6.45	134 6968	11 40.8
6	22 33 16.95	16.770	11 23 28.9	101.71	2.45	6.44	135 4879	11 43.6
7	22 40 00.31	16.844	10 42 09.1	104.93	2.44	6.43	136 0979	11 46.4
8	22 46 45.46	+16.919	-9 59 32.3	+108.13	2.44	6.43	0.136 5184	11 49.2
9	22 53 32.45	16.997	9 15 39.1	111.30	2.44	6.42	136 7398	11 52.1
10	23 00 21.33	17.077	8 30 30.6	114.41	2.44	6.42	136 7515	11 55.0
11	23 07 12.16	17.159	7 44 08.1	117.46	2.44	6.43	136 5415	11 57.9
12	23 14 04.98	17.243	6 56 33.1	120.45	2.44	6.43	136 0965	12 00.9
13	23 20 59.82	+17.327	-6 07 47.4	+123.35	2.45	6.44	0.135 4020	12 03.9
14	23 27 56.69	17.412	5 17 53.3	126.15	2.45	6.46	134 4419	12 06.9
15	23 34 55.57	17.495	4 26 53.6	128.82	2.46	6.48	133 1982	12 09.9
16	23 41 56.41	17.575	3 34 51.5	131.34	2.47	6.50	131 6522	12 13.0
17	23 48 59.14	17.651	2 41 50.7	133.70	2.48	6.53	129 7837	12 16.2
18	23 56 03.61	+17.720	-1 47 55.9	+135.84	2.49	6.56	0.127 5711	12 19.3
19	00 03 09.63	17.780	-0 53 12.3	137.75	2.51	6.60	124 9914	12 22.5
20	00 10 16.93	17.827	+0 02 13.9	139.38	2.52	6.64	122 0214	12 25.7
21	00 17 25.18	17.858	0 58 15.5	140.70	2.54	6.70	118 6365	12 28.9
22	00 24 33.93	17.868	1 54 44.4	141.65	2.56	6.75	114 8126	12 32.1
23	00 31 42.64	+17.854	+2 51 31.5	+142.20	2.59	6.82	0.110 5268	12 35.3
24	00 38 50.68	17.811	3 48 26.4	142.30	2.62	6.90	105 7564	12 38.5
25	00 45 57.27	17.732	4 45 17.8	141.90	2.65	6.98	100 4809	12 41.6
26	00 53 01.52	17.615	5 41 53.5	140.98	2.69	7.08	094 6827	12 44.8
27	01 00 02.45	17.455	6 38 00.4	139.50	2.73	7.18	088 3477	12 47.8
28	01 06 58.94	+17.245	+7 33 24.6	+137.42	2.77	7.29	0.081 4666	12 50.8
29	01 13 49.79	16.984	8 27 52.0	134.75	2.82	7.42	074 0348	12 53.6
30	01 20 33.70	16.667	9 21 08.2	131.50	2.87	7.56	066 0539	12 56.3
31	01 27 09.33	16.293	10 12 58.9	127.64	2.93	7.71	057 5310	12 58.9
Apr. 1	01 33 35.30	15.861	11 03 10.4	123.22	2.99	7.87	048 4800	13 01.3
2	01 39 50.20	+15.373	+11 51 29.5	+118.28	3.05	8.04	0.038 9205	13 03.5
3	01 45 52.65	+14.825	+12 37 44.1	+112.86	3.13	8.23	0.028 8781	13 05.5

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Apr. 1	^h 01 ^m 33 ^s 35.30	+15.861	[°] +11 ['] 03 ["] 10.4	+123.22	2.99	7.87	0.048 4800	^h 13 ^m 01.3
2	01 39 50.20	15.373	11 51 29.5	118.28	3.05	8.04	.038 9205	13 03.5
3	01 45 52.65	14.825	12 37 44.1	112.86	3.13	8.23	.028 8781	13 05.5
4	01 51 41.31	14.222	13 21 43.2	106.99	3.20	8.43	.018 3838	13 07.2
5	01 57 14.88	13.567	14 03 16.7	100.74	3.28	8.65	0.007 4729	13 08.7
6	02 02 32.13	+12.863	+14 42 16.1	+ 94.16	3.37	8.88	9.996 1847	13 09.9
7	02 07 31.92	12.112	15 18 33.9	87.28	3.46	9.12	.984 5621	13 10.8
8	02 12 13.17	11.319	15 52 03.9	80.17	3.56	9.37	.972 6507	13 11.3
9	02 16 34.90	10.486	16 22 40.7	72.87	3.66	9.64	.960 4980	13 11.6
10	02 20 36.24	9.620	16 50 20.0	65.39	3.77	9.92	.948 1542	13 11.4
11	02 24 16.41	+ 8.722	+17 14 58.3	+ 57.78	3.87	10.20	9.935 6709	13 11.0
12	02 27 34.69	7.798	17 36 32.5	50.06	3.98	10.50	.923 1015	13 10.1
13	02 30 30.52	6.852	17 55 00.2	42.24	4.10	10.81	.910 5011	13 08.9
14	02 33 03.43	5.888	18 10 19.5	34.36	4.23	11.13	.897 9268	13 07.3
15	02 35 13.08	4.915	18 22 28.8	26.41	4.35	11.46	.885 4377	13 05.3
16	02 36 59.27	+ 3.935	+18 31 27.1	+ 18.43	4.48	11.79	9.873 0952	13 02.9
17	02 38 21.96	2.957	18 37 13.7	10.45	4.60	12.12	.860 9627	13 00.2
18	02 39 21.26	1.987	18 39 48.6	+ 2.46	4.73	12.46	.849 1053	12 57.0
19	02 39 57.50	1.036	18 39 12.6	- 5.45	4.86	12.79	.837 5907	12 53.5
20	02 40 11.22	+ 0.113	18 35 27.4	13.29	4.98	13.12	.826 4880	12 49.6
21	02 40 03.20	- 0.774	+18 28 35.9	- 20.97	5.10	13.45	9.815 8677	12 45.3
22	02 39 34.44	1.614	18 18 42.5	28.44	5.22	13.76	.805 7998	12 40.7
23	02 38 46.20	2.395	18 05 53.1	35.62	5.34	14.06	.796 3544	12 35.9
24	02 37 40.04	3.106	17 50 15.9	42.41	5.45	14.35	.787 5994	12 30.7
25	02 36 17.73	3.739	17 32 01.1	48.74	5.55	14.62	.779 5994	12 25.3
26	02 34 41.31	- 4.282	+17 11 21.2	- 54.49	5.64	14.86	9.772 4138	12 19.6
27	02 32 53.00	4.728	16 48 31.1	59.57	5.73	15.08	.766 0953	12 13.8
28	02 30 55.20	5.071	16 23 48.0	63.89	5.80	15.27	.760 6886	12 07.9
29	02 28 50.45	5.306	15 57 31.2	67.36	5.86	15.43	.756 2289	12 01.8
30	02 26 41.36	5.433	15 30 01.9	69.93	5.90	15.55	.752 7404	11 55.7
May 1	02 24 30.55	- 5.451	+15 01 42.6	- 71.53	5.94	15.64	9.750 2355	11 49.7
2	02 22 20.58	5.363	14 32 56.5	72.15	5.96	15.70	.748 7148	11 43.6
3	02 20 13.92	5.175	14 04 07.1	71.80	5.96	15.71	.748 1665	11 37.6
4	02 18 12.91	4.894	13 35 37.7	70.50	5.96	15.70	.748 5684	11 31.7
5	02 16 19.66	4.529	13 07 50.5	68.30	5.94	15.65	.749 8877	11 26.0
6	02 14 36.08	- 4.091	+12 41 06.0	- 65.27	5.91	15.57	9.752 0819	11 20.4
7	02 13 03.82	3.588	12 15 43.1	61.51	5.87	15.47	.755 1022	11 15.1
8	02 11 44.27	3.032	11 51 58.4	57.11	5.82	15.33	.758 8939	11 09.9
9	02 10 38.59	2.434	11 30 06.1	52.17	5.76	15.17	.763 3990	11 05.0
10	02 09 47.69	1.803	11 10 17.9	46.78	5.69	14.99	.768 5567	11 00.4
11	02 09 12.23	- 1.149	+10 52 43.2	- 41.06	5.62	14.80	9.774 3062	10 56.0
12	02 08 52.67	- 0.479	10 37 28.8	35.10	5.54	14.58	.780 5874	10 51.8
13	02 08 49.30	+ 0.199	10 24 39.5	28.98	5.45	14.36	.787 3417	10 48.0
14	02 09 02.25	0.880	10 14 18.3	22.78	5.36	14.12	.794 5132	10 44.4
15	02 09 31.53	1.559	10 06 26.1	16.58	5.27	13.88	.802 0492	10 41.0
16	02 10 17.02	+ 2.230	+10 01 02.5	- 10.40	5.18	13.63	9.809 9003	10 38.0
17	02 11 18.52	+ 2.892	+ 9 58 06.0	- 4.33	5.08	13.38	9.818 0215	10 35.2

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Semi- diam- eter.	Hor. Par.	Log of True Dist. from the Earth.	Meri- dian Passage
	^h ^m ^s	^s	[°] ['] ["]	["]	["]	["]		^h ^m
May 17	02 11 18.52	+ 2.892	+ 9 58 06.0	- 4.33	5.08	13.38	9.818 0215	10 35.2
18	02 12 35.76	3.542	9 57 33.7	+ 1.62	4.99	13.13	.826 3712	10 32.7
19	02 14 08.45	4.179	9 59 22.4	7.40	4.89	12.87	.834 9119	10 30.4
20	02 15 56.25	4.801	10 03 27.6	13.00	4.79	12.61	.843 6095	10 28.3
21	02 17 58.81	5.410	10 09 44.8	18.40	4.69	12.36	.852 4336	10 26.6
22	02 20 15.78	+ 6.003	+10 18 08.9	+ 23.58	4.60	12.11	9.861 3570	10 25.0
23	02 22 46.82	6.582	10 28 34.6	28.53	4.50	11.86	.870 3552	10 23.7
24	02 25 31.61	7.148	10 40 56.5	33.25	4.41	11.62	.879 4067	10 22.6
25	02 28 29.82	7.701	10 55 08.9	37.74	4.32	11.38	.888 4923	10 21.7
26	02 31 41.19	8.244	11 11 06.2	42.00	4.23	11.14	.897 5943	10 21.0
27	02 35 05.47	+ 8.777	+11 28 42.9	+ 46.02	4.14	10.91	9.906 6975	10 20.6
28	02 38 42.44	9.302	11 47 53.2	49.79	4.06	10.68	.915 7878	10 20.4
29	02 42 31.91	9.820	12 08 31.4	53.35	3.97	10.46	.924 8523	10 20.3
30	02 46 33.76	10.333	12 30 31.9	56.65	3.89	10.25	.933 8792	10 20.5
31	02 50 47.86	10.842	12 53 49.0	59.73	3.81	10.04	.942 8574	10 20.9
June 1	02 55 14.15	+11.349	+13 18 17.1	+ 62.57	3.73	9.83	9.951 7765	10 21.5
2	02 59 52.60	11.855	13 43 50.4	65.17	3.66	9.64	.960 6261	10 22.3
3	03 04 43.20	12.362	14 10 23.2	67.53	3.58	9.44	.969 3963	10 23.2
4	03 09 45.99	12.871	14 37 49.7	69.64	3.51	9.26	.978 0770	10 24.4
5	03 15 01.04	13.384	15 06 03.8	71.50	3.44	9.07	.986 6579	10 25.8
6	03 20 28.45	+13.901	+15 34 59.5	+ 73.10	3.38	8.90	9.995 1284	10 27.4
7	03 26 08.34	14.424	16 04 30.4	74.43	3.32	8.73	0.003 4771	10 29.3
8	03 32 00.86	14.953	16 34 29.9	75.48	3.25	8.57	.011 6924	10 31.3
9	03 38 06.16	15.490	17 04 51.0	76.23	3.19	8.41	.019 7615	10 33.5
10	03 44 24.42	16.033	17 35 26.6	76.68	3.14	8.26	.027 6705	10 36.0
11	03 50 55.82	+16.584	+18 06 09.1	+ 76.80	3.08	8.11	0.035 4048	10 38.7
12	03 57 40.53	17.142	18 36 50.3	76.57	3.03	7.97	.042 9481	10 41.6
13	04 04 38.70	17.705	19 07 21.7	75.98	2.98	7.84	.050 2830	10 44.7
14	04 11 50.45	18.274	19 37 34.0	74.98	2.93	7.71	.057 3906	10 48.1
15	04 19 15.85	18.843	20 07 17.6	73.58	2.88	7.59	.064 2505	10 51.7
16	04 26 54.88	+19.410	+20 36 22.3	+ 71.74	2.84	7.47	0.070 8417	10 55.5
17	04 34 47.48	19.972	21 04 37.2	69.42	2.80	7.37	.077 1415	10 59.5
18	04 42 53.44	20.523	21 31 50.9	66.64	2.76	7.27	.083 1262	11 03.8
19	04 51 12.46	21.059	21 57 51.9	63.36	2.72	7.17	.088 7720	11 08.3
20	04 59 44.08	21.571	22 22 28.0	59.56	2.69	7.09	.094 0550	11 13.0
21	05 08 27.66	+22.055	+22 45 26.9	+ 55.27	2.66	7.01	0.098 9516	11 17.9
22	05 17 22.41	22.501	23 06 36.8	50.48	2.63	6.93	.103 4394	11 22.9
23	05 26 27.34	22.902	23 25 46.0	45.21	2.61	6.87	.107 4977	11 28.2
24	05 35 41.29	23.252	23 42 43.3	39.50	2.59	6.81	.111 1085	11 33.6
25	05 45 02.95	23.543	23 57 18.7	33.39	2.57	6.76	.114 2573	11 39.1
26	05 54 30.85	+23.770	+24 09 23.5	+ 26.95	2.55	6.72	0.116 9332	11 44.6
27	06 04 03.39	23.930	24 18 50.2	20.23	2.54	6.69	.119 1208	11 50.3
28	06 13 38.92	24.019	24 25 33.2	13.32	2.53	6.66	.120 8452	11 56.0
29	06 23 15.73	24.038	24 29 28.8	+ 6.29	2.52	6.64	.122 0823	12 01.7
30	06 32 52.16	23.987	24 30 35.1	- 0.77	2.52	6.63	.122 8486	12 07.3
July 1	06 42 26.55	+23.869	+24 28 52.1	- 7.80	2.52	6.63	0.123 1552	12 13.0
2	06 51 57.37	+23.689	+24 24 21.7	- 14.72	2.52	6.63	0.123 0175	12 18.5

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Semi- diam- eter.	Hor. Par.	Log of True Dist. from the Earth.	Meri- dian Passage
July	^h ^m ^s	^s	[°] ['] ["]	["]	["]	["]		^h ^m
1	06 42 26.55	+23.869	+24 28 52.1	- 7.80	2.52	6.63	0.123 1552	12 13.0
2	06 51 57.37	23.689	24 24 21.7	14.72	2.52	6.63	.123 0175	12 18.5
3	07 01 23.18	23.453	24 17 07.3	21.45	2.52	6.64	.122 4534	12 24.0
4	07 10 42.70	23.166	24 07 13.8	27.97	2.53	6.65	.121 4834	12 29.3
5	07 19 54.80	22.836	23 54 47.0	34.21	2.53	6.67	.120 1294	12 34.5
6	07 28 58.52	+22.468	+23 39 54.1	- 40.14	2.54	6.70	0.118 4135	12 39.6
7	07 37 53.04	22.070	23 22 42.7	45.75	2.56	6.73	.116 3591	12 44.5
8	07 46 37.71	21.649	23 03 20.8	51.02	2.57	6.77	.113 9886	12 49.2
9	07 55 12.03	21.208	22 41 56.8	55.92	2.59	6.81	.111 3239	12 53.7
10	08 03 35.60	20.754	22 18 39.2	60.49	2.61	6.86	.108 3859	12 58.1
11	08 11 48.17	+20.292	+21 53 36.4	- 64.69	2.62	6.91	0.105 1943	13 02.3
12	08 19 49.56	19.823	21 26 56.7	68.55	2.64	6.96	.101 7673	13 06.3
13	08 27 39.68	19.354	20 58 48.2	72.09	2.67	7.02	.098 1215	13 10.1
14	08 35 18.53	18.884	20 29 18.9	75.30	2.69	7.08	.094 2723	13 13.7
15	08 42 46.14	18.417	19 58 36.2	78.21	2.72	7.15	.090 2336	13 17.1
16	08 50 02.59	+17.955	+19 26 47.3	- 80.82	2.74	7.22	0.086 0179	13 20.3
17	08 57 07.98	17.496	18 53 59.2	83.15	2.77	7.29	.081 6356	13 23.4
18	09 04 02.47	17.045	18 20 18.4	85.21	2.80	7.37	.077 0967	13 26.3
19	09 10 46.22	16.601	17 45 51.2	87.02	2.83	7.45	.072 4098	13 29.0
20	09 17 19.35	16.162	17 10 43.4	88.58	2.86	7.53	.067 5821	13 31.5
21	09 23 42.06	+15.731	+16 35 00.9	- 89.92	2.89	7.62	0.062 6201	13 33.8
22	09 29 54.51	15.307	15 58 49.1	91.03	2.93	7.71	.057 5292	13 36.0
23	09 35 56.86	14.889	15 22 13.1	91.93	2.96	7.80	.052 3138	13 38.0
24	09 41 49.25	14.477	14 45 17.8	92.64	3.00	7.90	.046 9778	13 39.8
25	09 47 31.81	14.070	14 08 08.1	93.14	3.04	8.00	.041 5243	13 41.5
26	09 53 04.67	+13.669	+13 30 48.5	- 93.46	3.08	8.10	0.035 9557	13 43.0
27	09 58 27.92	13.270	12 53 23.5	93.59	3.12	8.21	.030 2737	13 44.4
28	10 03 41.66	12.875	12 15 57.4	93.55	3.16	8.32	.024 4798	13 45.6
29	10 08 45.93	12.481	11 38 34.5	93.33	3.20	8.43	.018 5751	13 46.6
30	10 13 40.76	12.089	11 01 19.1	92.93	3.25	8.55	.012 5599	13 47.5
31	10 18 26.15	+11.695	+10 24 15.2	- 92.37	3.29	8.67	0.006 4346	13 48.2
Aug. 1	10 23 02.10	11.300	9 47 27.1	91.62	3.34	8.80	0.000 1995	13 48.8
2	10 27 28.53	10.902	9 10 58.9	90.70	3.39	8.93	9.993 8544	13 49.2
3	10 31 45.36	10.500	8 34 54.9	89.60	3.44	9.06	.987 3991	13 49.4
4	10 35 52.47	10.092	7 59 19.5	88.33	3.49	9.20	.980 8340	13 49.5
5	10 39 49.70	+ 9.676	+ 7 24 16.9	- 86.86	3.55	9.34	9.974 1591	13 49.4
6	10 43 36.85	9.251	6 49 51.9	85.19	3.60	9.49	.967 3749	13 49.2
7	10 47 13.67	8.815	6 16 09.3	83.33	3.66	9.64	.960 4823	13 48.7
8	10 50 39.89	8.367	5 43 14.0	81.25	3.72	9.80	.953 4829	13 48.1
9	10 53 55.19	7.905	5 11 11.3	78.94	3.78	9.96	.946 3790	13 47.3
10	10 56 59.21	+ 7.426	+ 4 40 06.5	- 76.42	3.84	10.12	9.939 1734	13 46.3
11	10 59 51.51	6.929	4 10 05.6	73.62	3.91	10.29	.931 8708	13 45.2
12	11 02 31.63	6.411	3 41 15.1	70.55	3.98	10.47	.924 4773	13 43.8
13	11 04 59.06	5.871	3 13 41.4	67.21	4.04	10.65	.917 0000	13 42.2
14	11 07 13.24	5.307	2 47 31.6	63.55	4.12	10.84	.909 4487	13 40.3
15	11 09 13.56	+ 4.716	+ 2 22 53.2	- 59.59	4.19	11.03	9.901 8360	13 38.3
16	11 10 59.37	+ 4.098	+ 1 59 54.4	- 55.25	4.26	11.23	9.894 1768	13 35.9

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Semi- diam- eter.	Hor. Par.	Log of True Dist. from the Earth.	Meri- dian Passage
Aug. 16	^{h m s} 11 10 59.37	^s + 4.098	^{° ' "} + 1 59 54.4	["] - 55.25	["] 4.26	["] 11.23	9.894 1768	^{h m} 13 35.9
17	11 12 30.00	3.450	1 38 43.9	50.56	4.34	11.43	.886 4903	13 33.4
18	11 13 44.72	2.772	1 19 30.6	45.48	4.42	11.63	.878 7994	13 30.5
19	11 14 42.81	2.064	1 02 24.3	39.98	4.50	11.84	.871 1319	13 27.4
20	11 15 23.56	1.327	0 47 35.0	34.05	4.58	12.05	.863 5205	13 24.0
21	11 15 46.25	+ 0.559	+ 0 35 13.1	- 27.69	4.66	12.26	9.856 0043	13 20.2
22	11 15 50.23	- 0.232	0 25 29.3	20.88	4.73	12.47	.848 6292	13 16.2
23	11 15 34.91	1.048	0 18 34.3	13.63	4.81	12.68	.841 4483	13 11.8
24	11 14 59.83	1.878	0 14 38.5	- 5.95	4.89	12.88	.834 5222	13 07.1
25	11 14 04.70	2.717	0 13 51.9	+ 2.13	4.97	13.08	.827 9200	13 02.1
26	11 12 49.44	- 3.554	+ 0 16 23.3	+ 10.54	5.04	13.27	9.821 7189	12 56.8
27	11 11 14.22	4.377	0 22 20.2	19.23	5.10	13.44	.816 0039	12 51.1
28	11 09 19.56	5.171	0 31 48.0	28.10	5.16	13.60	.810 8675	12 45.1
29	11 07 06.38	5.918	0 44 49.0	36.99	5.22	13.74	.806 4078	12 38.8
30	11 04 36.01	6.600	1 01 22.3	45.75	5.26	13.86	.802 7269	12 32.2
31	11 01 50.31	- 7.193	+ 1 21 22.6	+ 54.20	5.30	13.95	9.799 9277	12 25.4
Sept. 1	10 58 51.64	7.676	1 44 40.0	62.14	5.32	14.01	.798 1109	12 18.5
2	10 55 42.91	8.028	2 10 59.1	69.32	5.33	14.03	.797 3705	12 11.4
3	10 52 27.51	8.229	2 39 59.2	75.51	5.32	14.02	.797 7892	12 04.2
4	10 49 09.29	8.261	3 11 14.1	80.52	5.30	13.97	.799 4341	11 57.0
5	10 45 52.44	- 8.112	+ 3 44 12.8	+ 84.13	5.27	13.87	9.802 3520	11 49.8
6	10 42 41.42	7.775	4 18 20.3	86.22	5.22	13.74	.806 5661	11 42.8
7	10 39 40.78	7.248	4 52 58.5	86.69	5.15	13.56	.812 0736	11 36.0
8	10 36 55.00	6.537	5 27 28.1	85.50	5.07	13.35	.818 8452	11 29.4
9	10 34 28.36	5.655	6 01 09.5	82.68	4.98	13.11	.826 8246	11 23.3
10	10 32 24.79	- 4.618	+ 6 33 24.2	+ 78.29	4.88	12.84	9.835 9312	11 17.5
11	10 30 47.75	3.449	7 03 36.2	72.48	4.76	12.54	.846 0635	11 12.2
12	10 29 40.12	2.172	7 31 13.1	65.40	4.64	12.23	.857 1028	11 07.4
13	10 29 04.15	- 0.814	7 55 46.4	57.22	4.52	11.90	.868 9186	11 03.1
14	10 29 01.45	+ 0.596	8 16 52.3	48.14	4.39	11.56	.881 3722	10 59.4
15	10 29 32.96	+ 2.032	+ 8 34 11.3	+ 38.35	4.26	11.22	9.894 3216	10 56.2
16	10 30 38.99	3.468	8 47 28.9	28.05	4.14	10.89	.907 6251	10 53.6
17	10 32 19.25	4.881	8 56 34.6	17.39	4.01	10.55	.921 1453	10 51.6
18	10 34 32.90	6.248	9 01 22.3	+ 6.57	3.88	10.23	.934 7513	10 50.2
19	10 37 18.62	7.551	9 01 49.8	- 4.27	3.76	9.91	.948 3214	10 49.2
20	10 40 34.71	+ 8.776	+ 8 57 58.6	- 14.97	3.65	9.61	9.961 7445	10 48.8
21	10 44 19.13	9.910	8 49 53.5	25.40	3.54	9.32	.974 9213	10 48.8
22	10 48 29.59	10.945	8 37 42.2	35.47	3.44	9.05	9.987 7660	10 49.2
23	10 53 03.65	11.875	8 21 34.9	45.05	3.34	8.79	0.000 2058	10 50.0
24	10 57 58.74	12.698	8 01 44.1	54.08	3.25	8.56	.012 1810	10 51.1
25	11 03 12.31	+ 13.415	+ 7 38 24.2	- 62.48	3.16	8.33	0.023 6457	10 52.5
26	11 08 41.86	14.030	7 11 50.8	70.20	3.09	8.13	.034 5662	10 54.1
27	11 14 24.96	14.546	6 42 20.4	77.22	3.01	7.93	.044 9200	10 56.0
28	11 20 19.36	14.973	6 10 10.0	83.53	2.95	7.76	.054 6957	10 58.1
29	11 26 22.99	15.317	5 35 36.6	89.14	2.89	7.60	.063 8906	11 00.2
30	11 32 33.98	+ 15.587	+ 4 58 57.0	- 94.05	2.83	7.45	0.072 5094	11 02.5
Oct. 1	11 38 50.67	+ 15.793	+ 4 20 27.3	- 98.31	2.78	7.31	0.080 5633	11 04.9

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Semi- diam- eter.	Hor. Par.	Log of True Dist. from the Earth.	Meri- dian Passage
	h m s	s	° ' "	"	"	"		h m
Oct. 1	11 38 50.67	+15.793	+ 4 20 27.3	- 98.31	2.78	7.31	0.080 5633	11 04.9
2	11 45 11.61	15.943	3 40 23.0	101.95	2.73	7.18	0.088 0682	11 07.3
3	11 51 35.55	16.045	2 58 58.5	105.00	2.69	7.07	0.095 0432	11 09.8
4	11 58 01.45	16.108	2 16 27.2	107.52	2.64	6.96	0.101 5104	11 12.3
5	12 04 28.45	16.138	1 33 01.4	109.55	2.61	6.87	0.107 4933	11 14.8
6	12 10 55.83	+16.141	+ 0 48 52.4	-111.13	2.58	6.78	0.113 0157	11 17.3
7	12 17 23.04	16.124	+ 0 04 10.4	112.31	2.54	6.70	0.118 1017	11 19.8
8	12 23 49.64	16.090	- 0 40 55.6	113.13	2.52	6.63	0.122 7750	11 22.3
9	12 30 15.28	16.045	1 26 17.4	113.63	2.50	6.57	0.127 0588	11 24.8
10	12 36 39.72	15.992	2 11 47.7	113.85	2.47	6.51	0.130 9749	11 27.3
11	12 43 02.81	+15.932	- 2 57 20.0	-113.80	2.45	6.46	0.134 5440	11 29.7
12	12 49 24.43	15.869	3 42 48.4	113.53	2.43	6.41	0.137 7857	11 32.1
13	12 55 44.53	15.806	4 28 07.9	113.06	2.42	6.36	0.140 7180	11 34.5
14	13 02 03.10	15.742	5 13 13.8	112.40	2.40	6.33	0.143 3583	11 36.9
15	13 08 20.18	15.681	5 58 02.1	111.60	2.39	6.29	0.145 7219	11 39.2
16	13 14 35.81	+15.622	- 6 42 29.3	-110.64	2.38	6.26	0.147 8228	11 41.5
17	13 20 50.07	15.567	7 26 32.1	109.57	2.37	6.23	0.149 6742	11 43.8
18	13 27 03.06	15.516	8 10 07.6	108.37	2.36	6.21	0.151 2879	11 46.1
19	13 33 14.89	15.470	8 53 13.1	107.08	2.35	6.19	0.152 6746	11 48.3
20	13 39 25.69	15.430	9 35 46.5	105.69	2.34	6.17	0.153 8439	11 50.6
21	13 45 35.56	+15.394	-10 17 45.5	-104.22	2.34	6.16	0.154 8044	11 52.8
22	13 51 44.64	15.364	10 59 08.2	102.67	2.34	6.15	0.155 5637	11 55.0
23	13 57 53.07	15.339	11 39 52.8	101.04	2.33	6.14	0.156 1286	11 57.2
24	14 04 00.98	15.320	12 19 57.6	99.35	2.33	6.14	0.156 5049	11 59.4
25	14 10 08.48	15.306	12 59 21.2	97.60	2.33	6.13	0.156 6977	12 01.6
26	14 16 15.73	+15.298	-13 38 02.1	- 95.79	2.33	6.13	0.156 7114	12 03.7
27	14 22 22.83	15.294	14 15 58.7	93.92	2.33	6.14	0.156 5496	12 05.9
28	14 28 29.90	15.296	14 53 09.8	92.00	2.33	6.14	0.156 2155	12 08.1
29	14 34 37.08	15.303	15 29 34.0	90.01	2.34	6.15	0.155 7113	12 10.3
30	14 40 44.44	15.313	16 05 10.2	87.99	2.34	6.16	0.155 0387	12 12.5
31	14 46 52.11	+15.327	-16 39 56.9	- 85.90	2.34	6.17	0.154 1987	12 14.7
Nov. 1	14 53 00.16	15.345	17 13 53.0	83.77	2.35	6.18	0.153 1921	12 16.9
2	14 59 08.69	15.366	17 46 57.2	81.58	2.36	6.20	0.152 0189	12 19.1
3	15 05 17.76	15.390	18 19 08.4	79.35	2.36	6.22	0.150 6784	12 21.3
4	15 11 27.44	15.417	18 50 25.2	77.04	2.37	6.24	0.149 1697	12 23.5
5	15 17 37.77	+15.445	-19 20 46.3	- 74.70	2.38	6.27	0.147 4910	12 25.7
6	15 23 48.79	15.474	19 50 10.5	72.30	2.39	6.29	0.145 6401	12 28.0
7	15 30 00.51	15.503	20 18 36.5	69.85	2.40	6.32	0.143 6147	12 30.3
8	15 36 12.94	15.532	20 46 02.9	67.34	2.41	6.35	0.141 4111	12 32.5
9	15 42 26.07	15.561	21 12 28.3	64.77	2.43	6.39	0.139 0256	12 34.8
10	15 48 39.86	+15.587	-21 37 51.3	- 62.15	2.44	6.43	0.136 4544	12 37.1
11	15 54 54.25	15.611	22 02 10.7	59.46	2.46	6.47	0.133 6927	12 39.4
12	16 01 09.17	15.631	22 25 24.9	56.71	2.47	6.51	0.130 7344	12 41.7
13	16 07 24.50	15.646	22 47 32.4	53.90	2.49	6.56	0.127 5741	12 44.1
14	16 13 40.12	15.655	23 08 31.8	51.04	2.51	6.61	0.124 2052	12 46.4
15	16 19 55.87	+15.656	-23 28 21.7	- 48.11	2.53	6.66	0.120 6205	12 48.7
16	16 26 11.55	+15.649	-23 47 00.6	- 45.12	2.55	6.72	0.116 8124	12 51.0

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Semi- diam- eter.	Hor. Par.	Log of True Dist. from the Earth.	Meri- dian Passage
	^h ^m ^s	^s	[°] ['] ["]	["]	["]	["]		^h ^m
Nov. 16	16 26 11.55	+15.649	-23 47 00.6	- 45.12	2.55	6.72	0.1168124	12 51.0
17	16 32 26.93	15.631	24 04 26.9	42.06	2.58	6.79	.1127721	12 53.3
18	16 38 41.73	15.600	24 20 39.1	38.95	2.60	6.85	.1084905	12 55.6
19	16 44 55.64	15.556	24 35 35.9	35.78	2.63	6.93	.1039579	12 57.9
20	16 51 08.29	15.495	24 49 15.8	32.54	2.66	7.00	.0991637	13 00.2
21	16 57 19.25	+15.415	-25 01 37.4	- 29.25	2.69	7.09	0.0940962	13 02.4
22	17 03 28.01	15.312	25 12 39.3	25.90	2.72	7.17	.0887434	13 04.6
23	17 09 34.02	15.184	25 22 20.2	22.50	2.76	7.27	.0830927	13 06.7
24	17 15 36.62	15.028	25 30 39.1	19.06	2.80	7.37	.0771304	13 08.8
25	17 21 35.07	14.838	25 37 34.8	15.57	2.84	7.47	.0708425	13 10.8
26	17 27 28.52	+14.610	-25 43 06.1	- 12.04	2.88	7.59	0.0642143	13 12.7
27	17 33 16.01	14.340	25 47 12.5	8.49	2.93	7.71	.0572308	13 14.5
28	17 38 56.43	14.020	25 49 53.5	4.92	2.98	7.84	.0498773	13 16.1
29	17 44 28.53	13.646	25 51 08.6	- 1.34	3.03	7.99	.0421389	13 17.6
30	17 49 50.91	13.208	25 50 57.8	+ 2.24	3.09	8.14	.0340013	13 18.9
Dec. 1	17 55 01.96	+12.700	-25 49 21.3	+ 5.80	3.15	8.30	0.0254517	13 20.1
2	17 59 59.87	12.112	25 46 19.8	9.32	3.22	8.47	.0164794	13 21.0
3	18 04 42.59	11.433	25 41 54.6	12.78	3.29	8.66	0.0070764	13 21.6
4	18 09 07.85	10.655	25 36 06.9	16.18	3.36	8.86	9.9972392	13 21.9
5	18 13 13.10	9.763	25 28 58.8	19.48	3.44	9.07	.9869702	13 21.8
6	18 16 55.52	+ 8.750	-25 20 32.8	+ 22.66	3.53	9.29	9.9762801	13 21.3
7	18 20 12.02	7.601	25 10 52.1	25.71	3.62	9.53	.9651901	13 20.4
8	18 22 59.25	6.310	25 00 00.2	28.59	3.72	9.79	.9537349	13 18.9
9	18 25 13.68	4.867	24 48 01.1	31.31	3.82	10.06	.9419668	13 16.9
10	18 26 51.62	3.270	24 34 59.0	33.83	3.93	10.34	.9299592	13 14.3
11	18 27 49.43	+ 1.523	-24 20 58.6	+ 36.17	4.04	10.63	9.9178106	13 10.9
12	18 28 03.61	- 0.363	24 06 04.5	38.31	4.15	10.94	.9056491	13 06.8
13	18 27 31.11	2.362	23 50 21.6	40.25	4.27	11.24	.8936354	13 01.9
14	18 26 09.64	4.435	23 33 54.3	42.00	4.39	11.55	.8819636	12 56.1
15	18 23 58.05	6.528	23 16 47.4	43.55	4.50	11.85	.8708609	12 49.6
16	18 20 56.77	- 8.563	-22 59 06.0	+ 44.85	4.61	12.13	9.8605814	12 42.2
17	18 17 08.13	10.458	22 40 56.7	45.87	4.70	12.39	.8513958	12 34.1
18	18 12 36.72	12.112	22 22 27.7	46.47	4.79	12.62	.8435754	12 25.4
19	18 07 29.45	13.432	22 03 50.3	46.54	4.86	12.80	.8373719	12 16.1
20	18 01 55.39	14.333	21 45 19.6	45.89	4.91	12.93	.8329944	12 06.5
21	17 56 05.28	-14.761	-21 27 14.8	+ 44.36	4.94	13.00	9.8305880	11 56.8
22	17 50 10.84	14.693	21 09 58.4	41.84	4.94	13.01	.8302179	11 47.0
23	17 44 23.87	14.146	20 53 55.0	38.27	4.92	12.96	.8318626	11 37.5
24	17 38 55.27	13.171	20 39 29.2	33.73	4.88	12.85	.8354180	11 28.4
25	17 33 54.47	11.844	20 27 02.7	28.35	4.82	12.70	.8407106	11 19.7
26	17 29 28.85	-10.256	-20 16 52.9	+ 22.39	4.75	12.50	9.8475167	11 11.7
27	17 25 43.55	8.497	20 09 10.8	16.08	4.66	12.27	.8555855	11 04.4
28	17 22 41.67	6.652	20 04 01.7	9.69	4.56	12.02	.8646590	10 57.8
29	17 20 24.36	4.792	20 01 24.2	+ 3.48	4.46	11.75	.8744891	10 51.9
30	17 18 51.33	2.970	20 01 11.8	- 2.37	4.36	11.47	.8848493	10 46.8
31	17 18 01.17	- 1.226	-20 03 13.8	- 7.71	4.25	11.19	9.8955413	10 42.3
32	17 17 51.66	+ 0.415	-20 07 17.0	- 12.46	4.15	10.92	9.9063969	10 38.5

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Semi- diam- eter.	Hor. Par.	Log of True Dist. from the Earth.	Meri- dian Passage
Jan. 1	^{h m s} 15 47 38.33	^s + 6.165	^{° ' "} -15 45 28.0	["] - 13.30	["] 19.34	["] 20.24	9.638 2556	^{h m} 09 08.4
2	15 50 08.95	6.386	15 51 01.0	14.44	19.04	19.92	.645 1424	09 07.0
3	15 52 44.79	6.600	15 57 00.3	15.48	18.74	19.61	.651 9769	09 05.7
4	15 55 25.69	6.807	16 03 23.5	16.44	18.45	19.31	.658 7567	09 04.4
5	15 58 11.49	7.009	16 10 08.6	17.31	18.17	19.01	.665 4794	09 03.3
6	16 01 02.04	+ 7.204	-16 17 13.5	- 18.09	17.89	18.72	9.672 1431	09 02.2
7	16 03 57.22	7.394	16 24 36.3	18.80	17.62	18.44	.678 7462	09 01.2
8	16 06 56.88	7.577	16 32 15.0	19.41	17.36	18.16	.685 2871	09 00.3
9	16 10 00.87	7.755	16 40 07.5	19.95	17.10	17.89	.691 7647	08 59.4
10	16 13 09.06	7.926	16 48 11.9	20.41	16.85	17.63	.698 1777	08 58.7
11	16 16 21.31	+ 8.094	-16 56 26.4	- 20.79	16.61	17.38	9.704 5253	08 58.0
12	16 19 37.51	8.255	17 04 49.1	21.09	16.37	17.13	.710 8068	08 57.3
13	16 22 57.52	8.411	17 13 18.3	21.32	16.13	16.88	.717 0221	08 56.7
14	16 26 21.22	8.563	17 21 52.1	21.49	15.91	16.65	.723 1709	08 56.2
15	16 29 48.50	8.709	17 30 29.0	21.58	15.68	16.41	.729 2531	08 55.7
16	16 33 19.24	+ 8.852	-17 39 07.3	- 21.60	15.47	16.19	9.735 2691	08 55.3
17	16 36 53.33	8.989	17 47 45.5	21.57	15.26	15.97	.741 2189	08 55.0
18	16 40 30.67	9.122	17 56 21.9	21.46	15.05	15.75	.747 1031	08 54.7
19	16 44 11.15	9.251	18 04 55.1	21.30	14.85	15.54	.752 9221	08 54.4
20	16 47 54.69	9.376	18 13 23.8	21.08	14.66	15.34	.758 6765	08 54.2
21	16 51 41.18	+ 9.498	-18 21 46.4	- 20.80	14.47	15.14	9.764 3667	08.54.1
22	16 55 30.54	9.615	18 30 01.7	20.47	14.28	14.94	.769 9936	08 54.0
23	16 59 22.69	9.730	18 38 08.4	20.09	14.10	14.75	.775 5579	08 53.9
24	17 03 17.54	9.841	18 46 05.4	19.65	13.92	14.57	.781 0603	08 53.9
25	17 07 15.02	9.948	18 53 51.3	19.17	13.75	14.39	.786 5017	08 53.9
26	17 11 15.05	+ 10.053	-19 01 25.0	- 18.63	13.58	14.21	9.791 8827	08 54.0
27	17 15 17.54	10.154	19 08 45.4	18.06	13.42	14.04	.797 2042	08 54.1
28	17 19 22.43	10.253	19 15 51.3	17.43	13.26	13.87	.802 4670	08 54.3
29	17 23 29.64	10.348	19 22 41.5	16.76	13.09	13.70	.807 6718	08 54.5
30	17 27 39.11	10.441	19 29 15.2	16.04	12.94	13.54	.812 8193	08 54.7
31	17 31 50.77	+ 10.531	-19 35 31.3	- 15.29	12.79	13.38	9.817 9104	08 55.0
Feb. 1	17 36 04.56	10.618	19 41 28.9	14.50	12.64	13.23	.822 9459	08 55.3
2	17 40 20.41	10.702	19 47 07.0	13.66	12.50	13.08	.827 9262	08 55.6
3	17 44 38.24	10.783	19 52 24.6	12.80	12.36	12.93	.832 8520	08 55.9
4	17 48 58.00	10.863	19 57 21.0	11.89	12.22	12.79	.837 7239	08 56.3
5	17 53 19.63	+ 10.939	-20 01 55.2	- 10.95	12.09	12.65	9.842 5425	08 56.8
6	17 57 43.04	11.012	20 06 06.4	9.98	11.96	12.51	.847 3082	08 57.2
7	18 02 08.18	11.082	20 09 53.8	8.97	11.82	12.37	.852 0214	08 57.7
8	18 06 34.97	11.150	20 13 16.7	7.93	11.70	12.24	.856 6828	08 58.2
9	18 11 03.33	11.213	20 16 14.3	6.86	11.57	12.11	.861 2928	08 58.8
10	18 15 33.20	+ 11.275	-20 18 45.8	- 5.76	11.45	11.98	9.865 8521	08 59.3
11	18 20 04.50	11.333	20 20 50.7	4.64	11.33	11.86	.870 3611	08 59.9
12	18 24 37.15	11.388	20 22 28.4	3.50	11.22	11.74	.874 8207	09 00.5
13	18 29 11.08	11.439	20 23 38.3	2.33	11.11	11.62	.879 2313	09 01.2
14	18 33 46.21	11.488	20 24 19.9	- 1.14	10.99	11.50	.883 5937	09 01.8
15	18 38 22.48	+ 11.534	-20 24 32.8	+ 0.07	10.89	11.39	9.887 9087	09 02.5
16	18 42 59.80	+ 11.576	-20 24 16.5	+ 1.29	10.78	11.28	9.892 1770	09 03.2

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Semi- diam- eter.	Hor. Par.	Log of True Dist. from the Earth.	Meri- dian Passage
Feb. 16	^{h m} 18 42 59.80	^s +11.576	^{° ' "} -20 24 16.5	["] + 1.29	10.78	11.28	9.892 1770	^{h m} 09 03.2
17	18 47 38.12	11.616	20 23 30.5	2.54	10.67	11.17	.896 3992	09 03.9
18	18 52 17.36	11.653	20 22 14.4	3.80	10.57	11.06	.900 5762	09 04.6
19	18 56 57.44	11.687	20 20 27.9	5.07	10.47	10.96	.904 7086	09 05.3
20	19 01 38.31	11.718	20 18 10.8	6.35	10.38	10.86	.908 7973	09 06.1
21	19 06 19.90	+11.747	-20 15 22.8	+ 7.65	10.28	10.76	9.912 8430	09 06.8
22	19 11 02.16	11.773	20 12 03.6	8.95	10.19	10.66	.916 8464	09 07.6
23	19 15 45.00	11.796	20 08 13.0	10.26	10.09	10.56	.920 8081	09 08.4
24	19 20 28.37	11.818	20 03 50.9	11.58	10.00	10.47	.924 7289	09 09.2
25	19 25 12.22	11.836	19 58 57.2	12.90	9.91	10.37	.928 6094	09 10.0
26	19 29 56.48	+11.853	-19 53 31.6	+ 14.23	9.82	10.28	9.932 4507	09 10.7
27	19 34 41.12	11.866	19 47 34.2	15.55	9.74	10.19	.936 2530	09 11.6
28	19 39 26.05	11.878	19 41 04.9	16.89	9.65	10.10	.940 0172	09 12.4
Mar. 1	19 44 11.24	11.888	19 34 03.7	18.22	9.57	10.02	.943 7437	09 13.2
2	19 48 56.64	11.896	19 26 30.5	19.55	9.49	9.93	.947 4331	09 14.0
3	19 53 42.21	+11.901	-19 18 25.3	+ 20.88	9.41	9.85	9.951 0860	09 14.8
4	19 58 27.88	11.905	19 09 48.3	22.21	9.34	9.77	.954 7028	09 15.6
5	20 03 13.63	11.907	19 00 39.4	23.53	9.26	9.69	.958 2839	09 16.4
6	20 07 59.39	11.907	18 50 58.7	24.85	9.18	9.61	.961 8295	09 17.3
7	20 12 45.14	11.905	18 40 46.4	26.17	9.11	9.53	.965 3402	09 18.1
8	20 17 30.82	+11.901	-18 30 02.7	+ 27.48	9.04	9.46	9.968 8160	09 18.9
9	20 22 16.38	11.895	18 18 47.7	28.78	8.96	9.38	.972 2573	09 19.7
10	20 27 01.79	11.888	18 07 01.6	30.06	8.90	9.31	.975 6645	09 20.5
11	20 31 47.01	11.879	17 54 44.7	31.34	8.83	9.24	.979 0379	09 21.3
12	20 36 31.98	11.868	17 41 57.3	32.61	8.75	9.16	.982 3778	09 22.2
13	20 41 16.68	+11.856	-17 28 39.6	+ 33.86	8.69	9.09	9.985 6844	09 23.0
14	20 46 01.07	11.842	17 14 52.0	35.10	8.63	9.03	.988 9582	09 23.7
15	20 50 45.10	11.827	17 00 34.9	36.32	8.56	8.96	.992 1997	09 24.5
16	20 55 28.76	11.810	16 45 48.7	37.53	8.50	8.89	.995 4093	09 25.3
17	21 00 12.00	11.793	16 30 33.6	38.72	8.44	8.83	9.998 5874	09 26.1
18	21 04 54.79	+11.773	-16 14 50.2	+ 39.89	8.37	8.76	0.001 7343	09 26.9
19	21 09 37.11	11.753	15 58 39.0	41.05	8.31	8.70	.004 8505	09 27.6
20	21 14 18.93	11.732	15 42 00.2	42.18	8.26	8.64	.007 9364	09 28.4
21	21 19 00.25	11.711	15 24 54.5	43.30	8.20	8.58	.010 9925	09 29.1
22	21 23 41.03	11.688	15 07 22.2	44.39	8.14	8.52	.014 0192	09 29.8
23	21 28 21.27	+11.665	-14 49 23.9	+ 45.47	8.09	8.46	0.017 0168	09 30.6
24	21 33 00.95	11.641	14 31 00.0	46.52	8.03	8.40	.019 9858	09 31.3
25	21 37 40.05	11.617	14 12 11.2	47.55	7.98	8.35	.022 9267	09 32.0
26	21 42 18.58	11.593	13 52 57.8	48.56	7.92	8.29	.025 8308	09 32.7
27	21 46 56.52	11.568	13 33 20.5	49.55	7.87	8.24	.028 7257	09 33.4
28	21 51 33.87	+11.544	-13 13 19.7	+ 50.51	7.82	8.18	0.031 5848	09 34.0
29	21 56 10.62	11.519	12 52 56.0	51.45	7.77	8.13	.034 4174	09 34.7
30	22 00 46.79	11.495	12 32 10.0	52.38	7.72	8.08	.037 2238	09 35.4
31	22 05 22.37	11.470	12 11 02.1	53.27	7.66	8.02	.040 0044	09 36.0
Apr. 1	22 09 57.37	11.447	11 49 33.0	54.15	7.62	7.97	.042 7595	09 36.7
2	22 14 31.81	+11.423	-11 27 43.1	+ 55.01	7.57	7.92	0.045 4894	09 37.3
3	22 19 05.67	+11.400	-11 05 33.0	+ 55.83	7.53	7.88	0.048 1942	09 37.9

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Semi- diam- eter.	Hor. Par.	Log of True Dist. from the Earth.	Meri- dian Passage
	^h ^m ^s	^s	[°] ['] ["]	["]	["]	["]		^h ^m
Apr. 1	22 09 57.37	+11.447	-11 49 33.0	+ 54.15	7.62	7.97	0.042 7595	09 36.7
2	22 14 31.81	11.423	11 27 43.1	55.01	7.57	7.92	.045 4894	09 37.3
3	22 19 05.67	11.400	11 05 33.0	55.83	7.53	7.88	.048 1942	09 37.9
4	22 23 38.99	11.377	10 43 03.3	56.64	7.48	7.83	.050 8740	09 38.5
5	22 28 11.76	11.355	10 20 14.6	57.42	7.44	7.78	.053 5290	09 39.1
6	22 32 44.00	+11.332	- 9 57 07.4	+ 58.18	7.39	7.73	0.056 1594	09 39.7
7	22 37 15.73	11.311	9 33 42.4	58.91	7.35	7.69	.058 7652	09 40.3
8	22 41 46.95	11.290	9 10 00.1	59.61	7.30	7.64	.061 3467	09 40.9
9	22 46 17.67	11.270	8 46 01.2	60.29	7.25	7.59	.063 9038	09 41.4
10	22 50 47.91	11.250	8 21 46.3	60.94	7.22	7.55	.066 4368	09 42.0
11	22 55 17.69	+11.231	- 7 57 16.1	+ 61.57	7.18	7.51	0.068 9458	09 42.5
12	22 59 47.00	11.213	7 32 31.2	62.17	7.13	7.46	.071 4310	09 43.1
13	23 04 15.89	11.195	7 07 32.2	62.74	7.09	7.42	.073 8926	09 43.6
14	23 08 44.37	11.178	6 42 19.7	63.29	7.05	7.38	.076 3305	09 44.1
15	23 13 12.45	11.162	6 16 54.6	63.81	7.01	7.34	.078 7451	09 44.7
16	23 17 40.15	+11.147	- 5 51 17.3	+ 64.30	6.98	7.30	0.081 1367	09 45.2
17	23 22 07.50	11.133	5 25 28.5	64.76	6.94	7.26	.083 5054	09 45.7
18	23 26 34.52	11.119	4 59 29.1	65.19	6.90	7.22	.085 8515	09 46.2
19	23 31 01.24	11.107	4 33 19.5	65.60	6.86	7.18	.088 1752	09 46.7
20	23 35 27.66	11.095	4 07 00.4	65.98	6.82	7.14	.090 4767	09 47.2
21	23 39 53.82	+11.085	- 3 40 32.5	+ 66.34	6.79	7.11	0.092 7561	09 47.7
22	23 44 19.75	11.076	3 13 56.4	66.66	6.76	7.07	.095 0137	09 48.2
23	23 48 45.48	11.068	2 47 12.9	66.96	6.72	7.03	.097 2499	09 48.7
24	23 53 11.04	11.062	2 20 22.5	67.23	6.69	7.00	.099 4648	09 49.2
25	23 57 36.45	11.056	1 53 26.0	67.48	6.65	6.96	.101 6587	09 49.6
26	00 02 01.75	+11.052	- 1 26 23.9	+ 67.70	6.62	6.93	0.103 8320	09 50.1
27	00 06 26.96	11.050	0 59 16.8	67.88	6.59	6.89	.105 9847	09 50.6
28	00 10 52.13	11.048	0 32 05.6	68.05	6.56	6.86	.108 1171	09 51.1
29	00 15 17.28	11.048	- 0 04 50.6	68.19	6.53	6.83	.110 2295	09 51.5
30	00 19 42.45	11.049	+ 0 22 27.5	68.31	6.49	6.79	.112 3221	09 52.0
May 1	00 24 07.68	+11.053	+ 0 49 47.8	+ 68.39	6.46	6.76	0.114 3949	09 52.5
2	00 28 33.00	11.057	1 17 09.9	68.45	6.43	6.73	.116 4480	09 53.0
3	00 32 58.45	11.064	1 44 33.3	68.49	6.40	6.70	.118 4813	09 53.5
4	00 37 24.07	11.071	2 11 57.1	68.49	6.37	6.67	.120 4952	09 54.0
5	00 41 49.89	11.080	2 39 20.7	68.47	6.35	6.64	.122 4895	09 54.4
6	00 46 15.93	+11.090	+ 3 06 43.6	+ 68.43	6.32	6.61	0.124 4642	09 54.9
7	00 50 42.24	11.102	3 34 05.0	68.35	6.29	6.58	.126 4194	09 55.4
8	00 55 08.86	11.116	4 01 24.2	68.25	6.26	6.55	.128 3551	09 55.9
9	00 59 35.80	11.130	4 28 40.6	68.12	6.23	6.52	.130 2712	09 56.4
10	01 04 03.11	11.146	4 55 53.6	67.96	6.20	6.49	.132 1679	09 57.0
11	01 08 30.83	+11.164	+ 5 23 02.3	+ 67.77	6.17	6.46	0.134 0452	09 57.5
12	01 12 58.98	11.182	5 50 06.2	67.55	6.15	6.43	.135 9032	09 58.0
13	01 17 27.58	11.202	6 17 04.5	67.31	6.13	6.41	.137 7419	09 58.5
14	01 21 56.68	11.223	6 43 56.6	67.03	6.10	6.38	.139 5613	09 59.1
15	01 26 26.31	11.246	7 10 41.7	66.73	6.07	6.35	.141 3616	09 59.6
16	01 30 56.50	+11.270	+ 7 37 19.3	+ 66.40	6.05	6.33	0.143 1428	10 00.2
17	01 35 27.27	+11.295	+ 8 03 48.5	+ 66.03	6.02	6.30	0.144 9050	10 00.8

Date	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Semi- diam- eter.	Hor. Par.	Log of True Dist. from the Earth.	Meri- dian Passage
	^h ^m ^s	^s	[°] ['] ["]	["]	["]	["]		^h ^m
May 17	01 35 27.27	+11.295	+ 8 03 48.5	+ 66.03	6.02	6.30	0.144 9050	10 00.8
18	01 39 58.65	11.321	8 30 08.7	65.64	6.00	6.28	.146 6483	10 01.4
19	01 44 30.68	11.348	8 56 19.1	65.22	5.97	6.25	.148 3728	10 02.0
20	01 49 03.38	11.377	9 22 19.0	64.77	5.95	6.23	.150 0786	10 02.6
21	01 53 36.78	11.407	9 48 07.9	64.29	5.93	6.20	.151 7659	10 03.2
22	01 58 10.91	+11.438	+10 13 44.9	+ 63.78	5.91	6.18	0.153 4349	10 03.8
23	02 02 45.80	11.470	10 39 09.4	63.25	5.89	6.16	.155 0858	10 04.5
24	02 07 21.47	11.503	11 04 20.5	62.68	5.86	6.13	.156 7187	10 05.1
25	02 11 57.96	11.538	11 29 17.9	62.09	5.84	6.11	.158 3338	10 05.8
26	02 16 35.29	11.573	11 54 00.7	61.47	5.82	6.09	.159 9312	10 06.5
27	02 21 13.49	+11.610	+12 18 28.2	+ 60.82	5.80	6.07	0.161 5108	10 07.2
28	02 25 52.58	11.647	12 42 39.7	60.14	5.77	6.04	.163 0729	10 07.9
29	02 30 32.61	11.687	13 06 34.6	59.43	5.75	6.02	.164 6178	10 08.6
30	02 35 13.57	11.727	13 30 12.2	58.69	5.73	6.00	.166 1453	10 09.4
31	02 39 55.51	11.769	13 53 31.7	57.93	5.71	5.98	.167 6558	10 10.1
June 1	02 44 38.44	+11.810	+14 16 32.6	+ 57.14	5.70	5.96	0.169 1491	10 10.9
2	02 49 22.39	11.852	14 39 14.1	56.31	5.68	5.94	.170 6252	10 11.7
3	02 54 07.37	11.896	15 01 35.4	55.46	5.66	5.92	.172 0843	10 12.5
4	02 58 53.41	11.940	15 23 36.1	54.58	5.64	5.90	.173 5260	10 13.4
5	03 03 40.52	11.985	15 45 15.2	53.67	5.62	5.88	.174 9505	10 14.2
6	03 08 28.71	+12.031	+16 06 32.2	+ 52.73	5.60	5.86	0.176 3577	10 15.1
7	03 13 18.00	12.076	16 27 26.2	51.77	5.58	5.84	.177 7476	10 16.0
8	03 18 08.38	12.122	16 47 56.7	50.77	5.56	5.82	.179 1203	10 16.9
9	03 22 59.88	12.169	17 08 02.9	49.74	5.55	5.81	.180 4756	10 17.8
10	03 27 52.50	12.216	17 27 44.0	48.68	5.53	5.79	.181 8136	10 18.7
11	03 32 46.23	+12.262	+17 46 59.3	+ 47.60	5.51	5.77	0.183 1343	10 19.7
12	03 37 41.09	12.309	18 05 48.4	46.48	5.50	5.75	.184 4378	10 20.7
13	03 42 37.07	12.356	18 24 10.3	45.34	5.49	5.74	.185 7239	10 21.7
14	03 47 34.17	12.403	18 42 04.5	44.17	5.47	5.72	.186 9928	10 22.7
15	03 52 32.38	12.448	18 59 30.3	42.97	5.45	5.70	.188 2444	10 23.7
16	03 57 31.68	+12.494	+19 16 26.9	+ 41.74	5.44	5.69	0.189 4787	10 24.8
17	04 02 32.09	12.539	19 32 53.8	40.49	5.42	5.67	.190 6959	10 25.9
18	04 07 33.56	12.584	19 48 50.3	39.21	5.41	5.66	.191 8959	10 27.0
19	04 12 36.10	12.628	20 04 15.7	37.91	5.39	5.64	.193 0790	10 28.1
20	04 17 39.70	12.672	20 19 09.5	36.57	5.38	5.63	.194 2452	10 29.2
21	04 22 44.33	+12.714	+20 33 31.0	+ 35.22	5.36	5.61	0.195 3947	10 30.3
22	04 27 49.97	12.756	20 47 19.7	33.84	5.35	5.60	.196 5276	10 31.5
23	04 32 56.59	12.796	21 00 35.0	32.43	5.33	5.58	.197 6439	10 32.7
24	04 38 04.18	12.836	21 13 16.3	31.01	5.32	5.57	.198 7438	10 33.9
25	04 43 12.73	12.875	21 25 23.1	29.56	5.30	5.55	.199 8275	10 35.1
26	04 48 22.18	+12.913	+21 36 54.9	+ 28.09	5.29	5.54	0.200 8951	10 36.3
27	04 53 32.52	12.949	21 47 51.2	26.60	5.28	5.53	.201 9465	10 37.5
28	04 58 43.72	12.984	21 58 11.5	25.09	5.27	5.51	.202 9819	10 38.8
29	05 03 55.75	13.018	22 07 55.3	23.55	5.26	5.50	.204 0014	10 40.0
30	05 09 08.57	13.051	22 17 02.1	22.01	5.25	5.49	.205 0049	10 41.3
July 1	05 14 22.16	+13.081	+22 25 31.6	+ 20.45	5.24	5.48	0.205 9925	10 42.6
2	05 19 36.46	+13.110	+22 33 23.3	+ 18.86	5.22	5.46	0.206 9641	10 43.9

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	^h ^m ^s	^s	[°] ['] ["]	["]	["]	["]		^h ^m
July 1	05 14 22.16	+13.081	+22 25 31.6	+ 20.45	5.24	5.48	0.205 9925	10 42.6
2	05 19 36.46	13.110	22 33 23.3	18.86	5.22	5.46	.206 9641	10 43.9
3	05 24 51.45	13.138	22 40 36.9	17.26	5.21	5.45	.207 9197	10 45.2
4	05 30 07.08	13.164	22 47 11.9	15.65	5.20	5.44	.208 8595	10 46.5
5	05 35 23.31	13.188	22 53 08.0	14.03	5.19	5.43	.209 7832	10 47.9
6	05 40 40.08	+13.210	+22 58 24.9	+ 12.38	5.18	5.42	0.210 6908	10 49.2
7	05 45 57.36	13.230	23 03 02.3	10.73	5.17	5.41	.211 5824	10 50.6
8	05 51 15.09	13.247	23 06 59.9	9.07	5.15	5.39	.212 4579	10 51.9
9	05 56 33.21	13.263	23 10 17.4	7.39	5.14	5.38	.213 3173	10 53.3
10	06 01 51.68	13.276	23 12 54.7	5.71	5.13	5.37	.214 1607	10 54.7
11	06 07 10.45	+13.287	+23 14 51.6	+ 4.03	5.12	5.36	0.214 9879	10 56.0
12	06 12 29.45	13.296	23 16 07.8	2.33	5.11	5.35	.215 7900	10 57.4
13	06 17 48.63	13.302	23 16 43.2	+ 0.63	5.10	5.34	.216 5940	10 58.8
14	06 23 07.95	13.307	23 16 37.8	- 1.08	5.09	5.33	.217 3728	11 00.2
15	06 28 27.34	13.309	23 15 51.4	2.78	5.08	5.32	.218 1354	11 01.6
16	06 33 46.75	+13.308	+23 14 24.1	- 4.49	5.08	5.32	0.218 8818	11 02.9
17	06 39 06.10	13.305	23 12 15.9	6.20	5.07	5.31	.219 6124	11 04.3
18	06 44 25.35	13.299	23 09 26.7	7.90	5.07	5.30	.220 3270	11 05.7
19	06 49 44.44	13.291	23 05 56.6	9.60	5.06	5.29	.221 0259	11 07.1
20	06 55 03.32	13.281	23 01 45.6	11.30	5.05	5.28	.221 7089	11 08.4
21	07 00 21.93	+13.269	+22 56 54.1	- 12.99	5.04	5.27	0.222 3762	11 09.8
22	07 05 40.22	13.255	22 51 22.0	14.68	5.03	5.26	.223 0280	11 11.2
23	07 10 58.14	13.238	22 45 09.6	16.35	5.03	5.26	.223 6644	11 12.5
24	07 16 15.63	13.220	22 38 17.0	18.03	5.02	5.25	.224 2855	11 13.9
25	07 21 32.66	13.199	22 30 44.5	19.68	5.01	5.24	.224 8913	11 15.2
26	07 26 49.18	+13.177	+22 22 32.2	- 21.33	5.01	5.24	0.225 4822	11 16.5
27	07 32 05.14	13.153	22 13 40.6	22.97	5.00	5.23	.226 0581	11 17.9
28	07 37 20.50	13.127	22 04 09.9	24.59	4.99	5.22	.226 6191	11 19.2
29	07 42 35.21	13.099	21 54 00.3	26.20	4.99	5.22	.227 1652	11 20.5
30	07 47 49.25	13.070	21 43 12.3	27.80	4.98	5.21	.227 6964	11 21.8
31	07 53 02.58	+13.040	+21 31 46.3	- 29.37	4.97	5.20	0.228 2129	11 23.0
Aug. 1	07 58 15.16	13.008	21 19 42.6	30.93	4.97	5.20	.228 7146	11 24.3
2	08 03 26.95	12.974	21 07 01.6	32.48	4.96	5.19	.229 2014	11 25.5
3	08 08 37.92	12.940	20 53 43.6	34.01	4.96	5.19	.229 6734	11 26.8
4	08 13 48.04	12.904	20 39 49.3	35.51	4.95	5.18	.230 1305	11 28.0
5	08 18 57.30	+12.867	+20 25 19.1	- 37.00	4.94	5.17	0.230 5730	11 29.2
6	08 24 05.65	12.829	20 10 13.5	38.46	4.94	5.17	.231 0006	11 30.4
7	08 29 13.08	12.790	19 54 33.0	39.91	4.93	5.16	.231 4134	11 31.6
8	08 34 19.56	12.750	19 38 18.1	41.33	4.93	5.16	.231 8113	11 32.7
9	08 39 25.08	12.710	19 21 29.3	42.73	4.93	5.16	.232 1944	11 33.9
10	08 44 29.61	+12.668	+19 04 07.2	- 44.11	4.92	5.15	0.232 5626	11 35.0
11	08 49 33.14	12.626	18 46 12.5	45.46	4.92	5.15	.232 9159	11 36.1
12	08 54 35.65	12.583	18 27 45.6	46.78	4.91	5.14	.233 2544	11 37.2
13	08 59 37.13	12.540	18 08 47.2	48.08	4.91	5.14	.233 5779	11 38.3
14	09 04 37.59	12.497	17 49 18.1	49.35	4.91	5.14	.233 8866	11 39.3
15	09 09 36.99	+12.453	+17 29 18.8	- 50.59	4.90	5.13	0.234 1804	11 40.4
16	09 14 35.34	+12.409	+17 08 49.9	- 51.81	4.90	5.13	0.234 4595	11 41.4

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	^h ^m ^s	^s	[°] ['] ["]	["]	["]	["]		^h ^m
Aug. 16	09 14 35.34	+12.409	+17 08 49.9	- 51.81	4.90	5.13	0.234 4595	11 41.4
17	09 19 32.64	12.365	16 47 52.2	53.00	4.89	5.12	.234 7240	11 42.4
18	09 24 28.88	12.321	16 26 26.3	54.16	4.89	5.12	.234 9739	11 43.4
19	09 29 24.06	12.277	16 04 32.9	55.29	4.89	5.12	.235 2094	11 44.3
20	09 34 18.20	12.234	15 42 12.7	56.39	4.89	5.12	.235 4306	11 45.3
21	09 39 11.28	+12.190	+15 19 26.4	- 57.47	4.88	5.11	0.235 6377	11 46.2
22	09 44 03.34	12.148	14 56 14.6	58.51	4.88	5.11	.235 8308	11 47.2
23	09 48 54.38	12.105	14 32 38.1	59.53	4.88	5.11	.236 0101	11 48.1
24	09 53 44.41	12.064	14 08 37.5	60.52	4.88	5.11	.236 1755	11 48.9
25	09 58 33.46	12.023	13 44 13.6	61.47	4.88	5.11	.236 3273	11 49.8
26	10 03 21.52	+11.982	+13 19 27.0	- 62.40	4.87	5.10	0.236 4654	11 50.7
27	10 08 08.63	11.944	12 54 18.6	63.30	4.87	5.10	.236 5900	11 51.5
28	10 12 54.81	11.905	12 28 48.8	64.17	4.87	5.10	.236 7012	11 52.3
29	10 17 40.09	11.869	12 02 58.5	65.02	4.87	5.10	.236 7989	11 53.1
30	10 22 24.49	11.832	11 36 48.3	65.83	4.87	5.10	.236 8833	11 53.9
Sept. 31	10 27 08.02	+11.797	+11 10 19.0	- 66.61	4.87	5.10	0.236 9544	11 54.7
1	10 31 50.73	11.762	10 43 31.3	67.36	4.87	5.10	.237 0121	11 55.5
2	10 36 32.64	11.730	10 16 25.8	68.08	4.87	5.10	.237 0565	11 56.2
3	10 41 13.77	11.698	9 49 03.4	68.78	4.87	5.10	.237 0876	11 56.9
4	10 45 54.15	11.667	9 21 24.8	69.44	4.87	5.10	.237 1055	11 57.7
5	10 50 33.83	+11.639	+ 8 53 30.6	- 70.08	4.87	5.10	0.237 1101	11 58.4
6	10 55 12.83	11.612	8 25 21.5	70.68	4.87	5.10	.237 1014	11 59.1
7	10 59 51.17	11.585	7 56 58.3	71.25	4.87	5.10	.237 0794	11 59.8
8	11 04 28.90	11.560	7 28 21.8	71.79	4.87	5.10	.237 0441	12 00.4
9	11 09 06.05	11.536	6 59 32.6	72.30	4.87	5.10	.236 9954	12 01.1
10	11 13 42.66	+11.515	+ 6 30 31.5	- 72.78	4.87	5.10	0.236 9334	12 01.8
11	11 18 18.75	11.494	6 01 19.3	73.23	4.87	5.10	.236 8581	12 02.4
12	11 22 54.37	11.474	5 31 56.6	73.65	4.87	5.10	.236 7694	12 03.1
13	11 27 29.55	11.457	5 02 24.3	74.03	4.87	5.10	.236 6675	12 03.7
14	11 32 04.32	11.441	4 32 43.1	74.39	4.87	5.10	.236 5524	12 04.4
15	11 36 38.71	+11.426	+ 4 02 53.7	- 74.72	4.87	5.10	0.236 4241	12 05.0
16	11 41 12.77	11.413	3 32 56.9	75.01	4.88	5.11	.236 2828	12 05.6
17	11 45 46.54	11.401	3 02 53.5	75.27	4.88	5.11	.236 1284	12 06.2
18	11 50 20.05	11.392	2 32 44.1	75.51	4.88	5.11	.235 9612	12 06.8
19	11 54 53.35	11.384	2 02 29.5	75.71	4.88	5.11	.235 7813	12 07.5
20	11 59 26.47	+11.377	+ 1 32 10.5	- 75.87	4.89	5.12	0.235 5888	12 08.1
21	12 03 59.46	11.372	1 01 47.8	76.01	4.89	5.12	.235 3838	12 08.7
22	12 08 32.36	11.370	0 31 22.1	76.13	4.89	5.12	.235 1665	12 09.3
23	12 13 05.21	11.368	+ 0 00 54.1	76.20	4.89	5.12	.234 9371	12 09.9
24	12 17 38.05	11.369	- 0 29 35.4	76.26	4.90	5.13	.234 6955	12 10.5
25	12 22 10.92	+11.371	- 1 00 05.8	- 76.27	4.90	5.13	0.234 4418	12 11.1
26	12 26 43.88	11.376	1 30 36.3	76.26	4.90	5.13	.234 1761	12 11.7
27	12 31 16.97	11.382	2 01 06.1	76.22	4.91	5.14	.233 8985	12 12.3
28	12 35 50.23	11.390	2 31 34.5	76.15	4.91	5.14	.233 6090	12 12.9
29	12 40 23.71	11.400	3 02 00.9	76.04	4.91	5.14	.233 3076	12 13.6
30	12 44 57.44	+11.411	- 3 32 24.4	- 75.91	4.92	5.15	0.232 9944	12 14.2
Oct. 1	12 49 31.47	+11.425	- 4 02 44.4	- 75.75	4.92	5.15	0.232 6695	12 14.8

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	h m s	s	° ' "	"	"	"		h m
Oct. 1	12 49 31.47	+11.425	- 4 02 44.4	- 75.75	4.92	5.15	0.232 6695	12 14.8
2	12 54 05.84	11.440	4 33 00.0	75.55	4.92	5.15	.232 3328	12 15.4
3	12 58 40.61	11.457	5 03 10.6	75.33	4.93	5.16	.231 9843	12 16.1
4	13 03 15.80	11.476	5 33 15.5	75.07	4.93	5.16	.231 6241	12 16.7
5	13 07 51.46	11.496	6 03 13.8	74.78	4.94	5.17	.231 2521	12 17.4
6	13 12 27.63	+11.519	- 6 33 04.8	- 74.46	4.94	5.17	0.230 8683	12 18.0
7	13 17 04.37	11.543	7 02 47.8	74.11	4.95	5.18	.230 4727	12 18.7
8	13 21 41.70	11.568	7 32 21.9	73.73	4.95	5.18	.230 0652	12 19.4
9	13 26 19.67	11.596	8 01 46.4	73.31	4.96	5.19	.229 6458	12 20.1
10	13 30 58.31	11.624	8 31 00.7	72.86	4.96	5.19	.229 2145	12 20.8
11	13 35 37.66	+11.655	- 9 00 03.6	- 72.38	4.97	5.20	0.228 7711	12 21.5
12	13 40 17.75	11.686	9 28 54.5	71.86	4.97	5.20	.228 3158	12 22.2
13	13 44 58.61	11.720	9 57 32.7	71.31	4.98	5.21	.227 8485	12 23.0
14	13 49 40.30	11.755	10 25 57.3	70.73	4.98	5.21	.227 3693	12 23.8
15	13 54 22.82	11.790	10 54 07.6	70.12	4.99	5.22	.226 8782	12 24.5
16	13 59 06.21	+11.827	- 11 22 02.7	- 69.47	4.99	5.22	0.226 3753	12 25.3
17	14 03 50.51	11.865	11 49 41.8	68.78	5.00	5.23	.225 8606	12 26.1
18	14 08 35.75	11.905	12 17 04.1	68.06	5.01	5.24	.225 3343	12 27.0
19	14 13 21.95	11.946	12 44 08.7	67.32	5.01	5.24	.224 7966	12 27.8
20	14 18 09.16	11.988	13 10 55.0	66.54	5.02	5.25	.224 2474	12 28.6
21	14 22 57.39	+12.031	- 13 37 22.2	- 65.72	5.03	5.26	0.223 6868	12 29.5
22	14 27 46.67	12.076	14 03 29.5	64.88	5.03	5.26	.223 1152	12 30.4
23	14 32 37.04	12.121	14 29 16.0	63.99	5.04	5.27	.222 5324	12 31.3
24	14 37 28.50	12.168	14 54 40.9	63.08	5.05	5.28	.221 9385	12 32.2
25	14 42 21.10	12.215	15 19 43.6	62.13	5.06	5.29	.221 3336	12 33.2
26	14 47 14.84	+12.264	- 15 44 23.1	- 61.16	5.06	5.29	0.220 7177	12 34.1
27	14 52 09.75	12.312	16 08 38.7	60.14	5.07	5.30	.220 0908	12 35.1
28	14 57 05.85	12.362	16 32 29.6	59.10	5.07	5.31	.219 4529	12 36.1
29	15 02 03.15	12.412	16 55 55.1	58.02	5.08	5.32	.218 8040	12 37.2
30	15 07 01.66	12.464	17 18 54.3	56.91	5.08	5.32	.218 1443	12 38.2
31	15 12 01.41	+12.515	- 17 41 26.4	- 55.76	5.09	5.33	0.217 4736	12 39.3
Nov. 1	15 17 02.40	12.567	18 03 30.7	54.59	5.10	5.34	.216 7920	12 40.3
2	15 22 04.64	12.619	18 25 06.4	53.38	5.11	5.35	.216 0995	12 41.4
3	15 27 08.13	12.671	18 46 12.6	52.14	5.12	5.36	.215 3960	12 42.6
4	15 32 12.87	12.724	19 06 48.8	50.87	5.13	5.37	.214 6814	12 43.7
5	15 37 18.87	+12.776	- 19 26 54.0	- 49.56	5.14	5.38	0.213 9558	12 44.9
6	15 42 26.12	12.828	19 46 27.5	48.23	5.14	5.38	.213 2189	12 46.1
7	15 47 34.61	12.880	20 05 28.5	46.86	5.15	5.39	.212 4707	12 47.3
8	15 52 44.34	12.931	20 23 56.3	45.46	5.16	5.40	.211 7111	12 48.5
9	15 57 55.28	12.981	20 41 50.2	44.03	5.17	5.41	.210 9400	12 49.8
10	16 03 07.44	+13.031	- 20 59 09.4	- 42.57	5.18	5.42	0.210 1573	12 51.0
11	16 08 20.77	13.080	21 15 53.3	41.08	5.19	5.43	.209 3631	12 52.3
12	16 13 35.26	13.128	21 32 01.0	39.56	5.20	5.44	.208 5572	12 53.7
13	16 18 50.88	13.174	21 47 31.9	38.01	5.21	5.45	.207 7397	12 55.0
14	16 24 07.59	13.219	22 02 25.5	36.44	5.22	5.46	.206 9106	12 56.3
15	16 29 25.37	+13.263	- 22 16 40.9	- 34.84	5.23	5.47	0.206 0700	12 57.7
16	16 34 44.18	+13.305	- 22 30 17.6	- 33.22	5.25	5.49	0.205 2179	12 59.1

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Semi- diam- eter.	Hor. Par.	Log of True Dist. from the Earth.	Meri- dian Passage
	^h ^m ^s [•]	[•]	[°] ['] ["]	["]	["]	["]		^h ^m
Nov. 16	16 34 44.18	+13.305	-22 30 17.6	- 33.22	5.25	5.49	0.205 2179	12 59.1
17	16 40 04.00	13.346	22 43 15.1	31.57	5.26	5.50	.204 3542	13 00.5
18	16 45 24.77	13.385	22 55 32.7	29.89	5.27	5.51	.203 4791	13 01.9
19	16 50 46.46	13.422	23 07 09.8	28.20	5.28	5.52	.202 5926	13 03.3
20	16 56 09.02	13.458	23 18 06.0	26.48	5.28	5.53	.201 6948	13 04.8
21	17 01 32.41	+13.491	-23 28 20.8	- 24.75	5.29	5.54	0.200 7856	13 06.2
22	17 06 56.58	13.522	23 37 53.7	22.99	5.30	5.55	.199 8651	13 07.7
23	17 12 21.47	13.552	23 46 44.3	21.22	5.32	5.57	.198 9333	13 09.1
24	17 17 47.05	13.579	23 54 52.1	19.43	5.33	5.58	.197 9902	13 10.6
25	17 23 13.24	13.604	24 02 16.8	17.63	5.34	5.59	.197 0358	13 12.2
26	17 28 40.01	+13.626	-24 08 58.0	- 15.80	5.35	5.60	0.196 0702	13 13.7
27	17 34 07.28	13.646	24 14 55.4	13.98	5.37	5.62	.195 0934	13 15.2
28	17 39 35.01	13.664	24 20 08.7	12.13	5.38	5.63	.194 1052	13 16.7
29	17 45 03.12	13.679	24 24 37.6	10.28	5.39	5.64	.193 1057	13 18.2
30	17 50 31.57	13.691	24 28 21.8	8.41	5.40	5.65	.192 0948	13 19.8
Dec. 1	17 56 00.28	+13.701	-24 31 21.2	- 6.54	5.42	5.67	0.191 0725	13 21.3
2	18 01 29.20	13.708	24 33 35.7	4.67	5.43	5.68	.190 0385	13 22.9
3	18 06 58.26	13.713	24 35 05.1	2.78	5.44	5.69	.188 9928	13 24.4
4	18 12 27.39	13.714	24 35 49.2	- 0.90	5.46	5.71	.187 9352	13 25.9
5	18 17 56.52	13.713	24 35 48.1	+ 0.99	5.47	5.72	.186 8658	13 27.5
6	18 23 25.59	+13.709	-24 35 01.6	+ 2.88	5.49	5.74	0.185 7842	13 29.0
7	18 28 54.53	13.702	24 33 29.8	4.77	5.50	5.75	.184 6903	13 30.6
8	18 34 23.27	13.692	24 31 12.7	6.65	5.51	5.77	.183 5840	13 32.1
9	18 39 51.73	13.679	24 28 10.6	8.53	5.52	5.78	.182 4651	13 33.6
10	18 45 19.85	13.663	24 24 23.4	10.40	5.54	5.80	.181 3335	13 35.2
11	18 50 47.56	+13.645	-24 19 51.2	+ 12.28	5.55	5.81	0.180 1891	13 36.7
12	18 56 14.79	13.624	24 14 34.3	14.13	5.57	5.83	.179 0319	13 38.2
13	19 01 41.48	13.600	24 08 33.0	15.98	5.58	5.84	.177 8617	13 39.7
14	19 07 07.55	13.573	24 01 47.5	17.81	5.60	5.86	.176 6784	13 41.2
15	19 12 32.95	13.543	23 54 18.1	19.64	5.61	5.87	.175 4821	13 42.6
16	19 17 57.61	+13.511	-23 46 05.1	+ 21.44	5.63	5.89	0.174 2728	13 44.1
17	19 23 21.48	13.477	23 37 08.9	23.23	5.65	5.91	.173 0503	13 45.6
18	19 28 44.50	13.441	23 27 30.0	25.01	5.66	5.92	.171 8147	13 47.0
19	19 34 06.61	13.402	23 17 08.7	26.77	5.68	5.94	.170 5660	13 48.4
20	19 39 27.76	13.360	23 06 05.3	28.51	5.70	5.96	.169 3040	13 49.8
21	19 44 47.91	+13.318	-22 54 20.6	+ 30.22	5.71	5.98	0.168 0287	13 51.2
22	19 50 07.00	13.273	22 41 54.9	31.91	5.72	5.99	.166 7402	13 52.6
23	19 55 25.00	13.227	22 28 48.8	33.59	5.74	6.01	.165 4383	13 53.9
24	20 00 41.87	13.179	22 15 02.9	35.23	5.76	6.03	.164 1230	13 55.2
25	20 05 57.57	13.129	22 00 37.7	36.86	5.78	6.05	.162 7043	13 56.5
26	20 11 12.06	+13.078	-21 45 33.8	+ 38.46	5.80	6.07	0.161 4521	13 57.8
27	20 16 25.33	13.027	21 29 51.8	40.03	5.82	6.09	.160 0964	13 59.1
28	20 21 37.33	12.973	21 13 32.4	41.58	5.83	6.10	.158 7270	14 00.3
29	20 26 48.05	12.920	20 56 36.1	43.11	5.85	6.12	.157 3439	14 01.6
30	20 31 57.46	12.865	20 39 03.6	44.60	5.87	6.14	.155 9470	14 02.8
31	20 37 05.55	+12.809	-20 20 55.6	+ 46.06	5.89	6.16	0.154 5359	14 03.9
32	20 42 12.29	+12.753	-20 02 12.8	+ 47.50	5.91	6.18	0.153 1105	14 05.1

MARS, 1931.

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Semi- diam- eter.	Hor. Par.	Log of True Dist. from the Earth.	Var. per Hour.	Meri- dian Passage
Jan.	^h ^m ^s 09 16 58.09	^s -1.715	[°] ['] ["] +19 46 48.4	["] +14.10	["] 6.44	["] 12.12	9.8608555	-1206.6	^h ^m 02 37.7
2	09 16 15.27	1.853	19 52 33.0	14.60	6.49	12.20	.8579956	1176.4	02 33.1
3	09 15 29.14	1.991	19 58 29.4	15.09	6.53	12.28	.8552102	1144.5	02 28.4
4	09 14 39.72	2.127	20 04 37.2	15.56	6.57	12.36	.8525034	1110.9	02 23.6
5	09 13 47.04	2.203	20 10 55.8	15.99	6.61	12.43	.8498792	1075.6	02 18.8
6	09 12 51.13	-2.306	+20 17 24.7	+16.41	6.65	12.51	9.8473417	-1038.7	02 13.9
7	09 11 52.04	2.528	20 24 03.2	16.80	6.69	12.58	.8448951	999.9	02 09.0
8	09 10 49.80	2.658	20 30 50.8	17.16	6.73	12.65	.8425437	959.3	02 04.1
9	09 09 44.48	2.785	20 37 46.6	17.49	6.76	12.71	.8402917	917.0	01 59.1
10	09 08 36.14	2.909	20 44 50.0	17.79	6.79	12.77	.8381436	872.8	01 54.0
11	09 07 24.86	-3.031	+20 52 00.2	+18.05	6.83	12.83	9.8361037	-826.9	01 48.9
12	09 06 10.72	3.147	20 59 16.2	18.28	6.86	12.89	.8341762	779.1	01 43.7
13	09 04 53.82	3.260	21 06 37.1	18.46	6.89	12.95	.8323655	729.6	01 38.5
14	09 03 34.27	3.368	21 14 02.2	18.62	6.91	13.00	.8306753	678.6	01 33.2
15	09 02 12.19	3.471	21 21 30.4	18.73	6.93	13.04	.8291095	626.0	01 27.9
16	09 00 47.71	-3.568	+21 29 00.8	+18.79	6.96	13.09	9.8276719	-571.7	01 22.6
17	08 59 20.96	3.659	21 36 32.1	18.81	6.98	13.13	.8263662	516.2	01 17.2
18	08 57 52.11	3.744	21 44 03.6	18.80	7.00	13.16	.8251951	459.4	01 11.8
19	08 56 21.31	3.822	21 51 34.2	18.73	7.02	13.19	.8241620	401.3	01 06.4
20	08 54 48.73	3.892	21 59 02.6	18.63	7.03	13.22	.8232696	342.3	01 00.9
21	08 53 14.54	-3.955	+22 06 28.1	+18.48	7.04	13.24	9.8225197	-282.5	00 55.4
22	08 51 38.93	4.011	22 13 49.4	18.29	7.05	13.26	.8219143	221.0	00 49.9
23	08 50 02.07	4.058	22 21 05.6	18.06	7.06	13.27	.8214551	160.8	00 44.4
24	08 48 24.17	4.098	22 28 15.7	17.78	7.06	13.28	.8211432	99.1	00 38.8
25	08 46 45.43	4.129	22 35 18.8	17.47	7.07	13.29	.8209797	-37.2	00 33.3
26	08 45 06.03	-4.152	+22 42 13.9	+17.11	7.07	13.29	9.8209650	+25.0	00 27.7
27	08 43 26.18	4.167	22 49 00.0	16.73	7.07	13.29	.8210998	87.3	00 22.1
28	08 41 46.08	4.173	22 55 36.5	16.31	7.06	13.28	.8213836	149.2	00 16.5
29	08 40 05.95	4.170	23 02 02.5	15.86	7.05	13.26	.8218158	210.8	00 10.9
30	08 38 25.97	4.160	23 08 17.4	15.38	7.04	13.24	.8223955	272.2	^{00 05.4} _{23 59.8}
Feb.	08 36 46.34	-4.141	+23 14 20.5	+14.87	7.03	13.22	9.8231215	+332.8	23 54.2
1	08 35 07.25	4.115	23 20 11.1	14.34	7.02	13.20	.8239923	302.7	23 48.6
2	08 33 28.90	4.080	23 25 48.8	13.80	7.01	13.17	.8250062	452.0	23 43.1
3	08 31 51.47	4.038	23 31 13.1	13.23	6.99	13.13	.8261613	510.4	23 37.6
4	08 30 15.13	3.989	23 36 23.6	12.65	6.96	13.09	.8274553	567.7	23 32.1
5	08 28 40.06	-3.932	+23 41 20.0	+12.05	6.94	13.05	9.8288859	+624.3	23 26.6
6	08 27 06.44	3.868	23 46 01.8	11.44	6.91	13.00	.8304507	679.5	23 21.1
7	08 25 34.44	3.798	23 50 29.0	10.83	6.89	12.95	.8321467	733.6	23 15.7
8	08 24 04.21	3.720	23 54 41.3	10.20	6.86	12.90	.8339713	786.6	23 10.3
9	08 22 35.92	3.636	23 58 38.5	9.57	6.83	12.84	.8359212	838.1	23 04.9
10	08 21 09.71	-3.546	+24 02 20.7	+8.94	6.80	12.78	9.8379932	+888.3	22 59.6
11	08 19 45.73	3.450	24 05 47.5	8.30	6.76	12.71	.8401838	936.9	22 54.3
12	08 18 24.14	3.348	24 08 59.1	7.67	6.73	12.65	.8424894	984.2	22 49.1
13	08 17 05.06	3.241	24 11 55.5	7.03	6.69	12.58	.8449064	1029.7	22 43.9
14	08 15 48.62	3.129	24 14 36.6	6.40	6.65	12.50	.8474305	1073.4	22 38.7
15	08 14 34.93	-3.011	+24 17 02.7	+5.77	6.61	12.43	9.8500576	+1115.5	22 33.6
16	08 13 24.10	-2.891	+24 19 13.9	+5.16	6.57	12.35	9.8527835	+1155.7	22 28.6

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Semi- diam- eter.	Hor. Par.	Log of True Dist. from the Earth.	Var. per Hour.	Meri- dian Passage
Feb. 16	h m s 08 13 24.10	s - 2.891	° ' " +24 19 13.9	" + 5.16	" 6.57	" 12.35	9.852 7835	+1155.7	h m 22 28.6
17	08 12 16.21	2.766	24 21 10.2	4.54	6.53	12.27	.855 6036	1194.2	22 23.6
18	08 11 11.38	2.637	24 22 52.1	3.94	6.48	12.19	.858 5139	1230.8	22 18.6
19	08 10 09.67	2.506	24 24 19.5	3.35	6.44	12.11	.861 5099	1265.5	22 13.7
20	08 09 11.14	2.371	24 25 32.7	2.76	6.39	12.02	.864 5871	1298.5	22 08.9
21	08 08 15.87	- 2.235	+24 26 32.0	+ 2.19	6.35	11.93	9.867 7412	+1329.6	22 04.1
22	08 07 23.90	2.096	24 27 17.8	1.63	6.30	11.84	.870 9677	1358.7	21 59.3
23	08 06 35.26	1.957	24 27 50.3	1.08	6.25	11.75	.874 2620	1386.2	21 54.6
24	08 05 49.98	1.816	24 28 09.7	0.55	6.20	11.66	.877 6201	1411.8	21 50.0
25	08 05 08.09	1.675	24 28 16.5	+ 0.02	6.16	11.57	.881 0375	1435.7	21 45.4
26	08 04 29.60	- 1.533	+24 28 10.9	- 0.49	6.11	11.48	9.884 5102	+1457.9	21 40.9
27	08 03 54.53	1.390	24 27 53.2	0.98	6.06	11.39	.888 0340	1478.4	21 36.4
28	08 03 22.86	1.249	24 27 23.8	1.46	6.01	11.29	.891 6049	1497.2	21 32.0
Mar. 1	08 02 54.58	1.108	24 26 43.0	1.93	5.96	11.20	.895 2193	1514.6	21 27.7
2	08 02 29.68	0.968	24 25 51.1	2.39	5.91	11.11	.898 8736	1530.5	21 23.4
3	08 02 08.12	- 0.828	+24 24 48.3	- 2.84	5.86	11.01	9.902 5643	+1544.9	21 19.1
4	08 01 49.90	0.690	24 23 35.1	3.26	5.81	10.92	.906 2879	1557.9	21 14.9
5	08 01 34.98	0.554	24 22 11.8	3.68	5.76	10.83	.910 0414	1569.8	21 10.8
6	08 01 23.32	0.418	24 20 38.6	4.08	5.71	10.73	.913 8218	1580.4	21 06.7
7	08 01 14.89	0.285	24 18 55.8	4.48	5.66	10.64	.917 6265	1589.9	21 02.7
8	08 01 09.65	- 0.152	+24 17 03.7	- 4.86	5.61	10.54	9.921 4526	+1598.4	20 58.7
9	08 01 07.57	- 0.021	24 15 02.4	5.24	5.56	10.45	.925 2978	1605.8	20 54.8
10	08 01 08.62	+ 0.108	24 12 52.2	5.61	5.51	10.36	.929 1596	1612.2	20 50.9
11	08 01 12.75	0.236	24 10 33.3	5.97	5.46	10.27	.933 0354	1617.5	20 47.1
12	08 01 19.93	0.362	24 08 05.8	6.32	5.41	10.18	.936 9231	1622.0	20 43.4
13	08 01 30.12	+ 0.487	+24 05 30.0	- 6.66	5.36	10.08	9.940 8201	+1625.5	20 39.6
14	08 01 43.27	0.609	24 02 46.0	7.00	5.31	9.99	.944 7248	1628.1	20 36.0
15	08 01 59.35	0.730	23 59 54.0	7.33	5.26	9.90	.948 6345	1629.8	20 32.4
16	08 02 18.31	0.849	23 56 54.1	7.66	5.22	9.82	.952 5473	1630.7	20 28.8
17	08 02 40.09	0.966	23 53 46.4	7.98	5.18	9.73	.956 4613	1630.8	20 25.2
18	08 03 04.66	+ 1.081	+23 50 31.1	- 8.30	5.13	9.64	9.960 3745	+1630.1	20 21.7
19	08 03 31.96	1.193	23 47 08.2	8.61	5.08	9.55	.964 2852	1628.7	20 18.3
20	08 04 01.93	1.304	23 43 37.9	8.92	5.04	9.47	.968 1915	1626.5	20 14.9
21	08 04 34.53	1.413	23 40 00.3	9.22	4.99	9.38	.972 0919	1623.7	20 11.6
22	08 05 09.70	1.518	23 36 15.3	9.52	4.95	9.30	.975 9846	1620.2	20 08.3
23	08 05 47.40	+ 1.623	+23 32 23.3	- 9.81	4.90	9.22	9.979 8683	+1616.2	20 05.0
24	08 06 27.57	1.724	23 28 24.2	10.11	4.86	9.14	.983 7416	1611.5	20 01.7
25	08 07 10.15	1.824	23 24 18.1	10.40	4.82	9.05	.987 6030	1606.3	19 58.5
26	08 07 55.09	1.921	23 20 05.1	10.68	4.77	8.97	.991 4514	1600.6	19 55.4
27	08 08 42.32	2.016	23 15 45.2	10.97	4.73	8.90	.995 2854	1594.4	19 52.3
28	08 09 31.80	+ 2.107	+23 11 18.5	- 11.25	4.69	8.82	9.999 1040	+1587.7	19 49.2
29	08 10 23.46	2.198	23 06 45.1	11.53	4.65	8.74	0.002 9060	1580.6	19 46.2
30	08 11 17.26	2.285	23 02 05.0	11.81	4.61	8.67	.006 6908	1573.3	19 43.2
31	08 12 13.11	2.370	22 57 18.4	12.08	4.57	8.59	.010 4576	1565.7	19 40.2
Apr. 1	08 13 10.98	2.453	22 52 25.2	12.35	4.53	8.52	.014 2058	1557.8	19 37.2
2	08 14 10.82	+ 2.533	+22 47 25.5	- 12.63	4.49	8.44	0.017 9347	+1549.6	19 34.3
3	08 15 12.56	+ 2.612	+22 42 19.3	- 12.89	4.45	8.37	0.021 6439	+1541.3	19 31.4

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Semi- dian- eter.	Hor. Par.	Log of True Dist. from the Earth.	Var. per Hour.	Meri- dian Passage
	^h ^m ^s	^s	[°] ['] ["]	["]	["]	["]			^h ^m
Apr. 1	08 13 10.98	+2.453	+22 52 25.2	-12.35	4.53	8.52	0.014 2058	+1557.8	19 37.2
2	08 14 10.82	2.533	22 47 25.5	12.63	4.49	8.44	.017 9347	1549.6	19 34.3
3	08 15 12.56	2.612	22 42 19.3	12.89	4.45	8.37	.021 6439	1541.3	19 31.4
4	08 16 16.16	2.688	22 37 06.7	13.16	4.41	8.30	.025 3328	1532.8	19 28.6
5	08 17 21.56	2.762	22 31 47.6	13.42	4.38	8.23	.029 0010	1524.1	19 25.8
6	08 18 28.73	+2.835	+22 26 22.2	-13.69	4.34	8.16	0.032 6481	+1515.2	19 23.0
7	08 19 37.63	2.906	22 20 50.3	13.96	4.30	8.09	.036 2738	1506.2	19 20.2
8	08 20 48.21	2.976	22 15 12.2	14.22	4.27	8.03	.039 8778	1497.1	19 17.4
9	08 22 00.43	3.043	22 09 27.6	14.49	4.23	7.96	.043 4599	1487.9	19 14.7
10	08 23 14.26	3.109	22 03 36.6	14.76	4.20	7.90	.047 0297	1478.6	19 12.0
11	08 24 29.65	+3.173	+21 57 39.2	-15.02	4.17	7.83	0.050 5569	+1469.0	19 09.4
12	08 25 46.57	3.236	21 51 35.4	15.30	4.13	7.77	.054 0711	1459.4	19 06.8
13	08 27 04.98	3.298	21 45 25.1	15.56	4.10	7.71	.057 5620	1449.6	19 04.2
14	08 28 24.86	3.358	21 39 08.4	15.83	4.07	7.65	.061 0292	1439.7	19 01.6
15	08 29 46.15	3.416	21 32 45.2	16.10	4.04	7.59	.064 4726	1429.7	18 59.0
16	08 31 08.83	+3.473	+21 26 15.5	-16.38	4.01	7.53	0.067 8918	+1419.6	18 56.4
17	08 32 32.85	3.528	21 19 39.3	16.64	3.98	7.47	.071 2865	1409.4	18 53.9
18	08 33 58.18	3.583	21 12 56.7	16.91	3.95	7.41	.074 6566	1399.0	18 51.4
19	08 35 24.79	3.635	21 06 07.5	17.19	3.91	7.35	.078 0017	1388.6	18 48.9
20	08 36 52.65	3.686	20 59 11.7	17.46	3.88	7.30	.081 3218	1378.1	18 46.5
21	08 38 21.72	+3.736	+20 52 09.5	-17.72	3.85	7.24	0.084 6165	+1367.5	18 44.0
22	08 39 51.96	3.784	20 45 00.9	18.00	3.83	7.19	.087 8855	1356.8	18 41.6
23	08 41 23.34	3.831	20 37 45.7	18.27	3.80	7.13	.091 1289	1346.0	18 39.2
24	08 42 55.83	3.876	20 30 24.0	18.54	3.77	7.08	.094 3464	1335.3	18 36.8
25	08 44 29.38	3.921	20 22 55.8	18.81	3.74	7.03	.097 5380	1324.4	18 34.5
26	08 46 03.99	+3.963	+20 15 21.1	-19.08	3.71	6.98	0.100 7036	+1313.6	18 32.1
27	08 47 39.59	4.004	20 07 39.9	19.35	3.69	6.93	.103 8433	1302.8	18 29.8
28	08 49 16.17	4.044	19 59 52.3	19.62	3.66	6.88	.106 9570	1292.0	18 27.5
29	08 50 53.70	4.083	19 51 58.3	19.88	3.64	6.83	.110 0449	1281.2	18 25.2
30	08 52 32.13	4.120	19 43 57.9	20.15	3.61	6.78	.113 1070	1270.5	18 22.9
May 1	08 54 11.44	+4.156	+19 35 51.2	-20.41	3.58	6.73	0.116 1434	+1259.9	18 20.6
2	08 55 51.61	4.191	19 27 38.1	20.68	3.56	6.69	.119 1545	1249.3	18 18.3
3	08 57 32.61	4.225	19 19 18.7	20.94	3.53	6.64	.122 1403	1238.9	18 16.1
4	08 59 14.42	4.259	19 10 52.9	21.20	3.51	6.60	.125 1011	1228.5	18 13.9
5	09 00 57.03	4.291	19 02 20.9	21.47	3.49	6.55	.128 0371	1218.2	18 11.7
6	09 02 40.40	+4.323	+18 53 42.5	-21.73	3.47	6.51	0.130 9484	+1207.9	18 09.5
7	09 04 24.51	4.353	18 44 57.7	22.00	3.44	6.47	.133 8352	1197.7	18 07.3
8	09 06 09.35	4.383	18 36 06.6	22.26	3.41	6.42	.136 6976	1187.6	18 05.1
9	09 07 54.91	4.413	18 27 09.2	22.53	3.39	6.38	.139 5357	1177.5	18 02.9
10	09 09 41.17	4.442	18 18 05.4	22.79	3.37	6.34	.142 3497	1167.5	18 00.7
11	09 11 28.10	+4.469	+18 08 55.4	-23.05	3.35	6.30	0.145 1395	+1157.4	17 58.6
12	09 13 15.68	4.496	17 59 39.0	23.32	3.33	6.26	.147 9053	1147.5	17 56.5
13	09 15 03.92	4.523	17 50 16.2	23.58	3.31	6.22	.150 6472	1137.5	17 54.3
14	09 16 52.78	4.549	17 40 47.1	23.85	3.29	6.18	.153 3652	1127.5	17 52.2
15	09 18 42.27	4.574	17 31 11.7	24.11	3.26	6.14	.156 0593	1117.6	17 50.1
16	09 20 32.34	+4.599	+17 21 29.9	-24.37	3.24	6.10	0.158 7296	+1107.7	17 48.0
17	09 22 23.00	+4.623	+17 11 41.9	-24.63	3.23	6.07	0.161 3762	+1097.8	17 45.9

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Semi- dian- eter.	Hor. Par.	Log of True Dist. from the Earth.	Var. per Hour.	Meri- dian Passage
May 17	^h 09 ^m 22 ^s 23.00	+4.623	[°] 17 ['] 11 ["] 41.9	-24.63	3.23	6.07	0.161 3762	+1097.8	^h 17 ^m 45.9
18	09 24 14.23	4.646	17 01 47.7	24.89	3.21	6.03	163 9991	1088.0	17 43.8
19	09 26 06.00	4.668	16 51 47.2	25.15	3.19	6.00	166 5984	1078.1	17 41.7
20	09 27 58.31	4.690	16 41 40.5	25.41	3.17	5.96	169 1739	1068.2	17 39.7
21	09 29 51.14	4.712	16 31 27.6	25.66	3.15	5.92	171 7258	1058.4	17 37.6
22	09 31 44.47	+4.733	+16 21 08.6	-25.92	3.13	5.89	0.174 2543	+1048.6	17 35.6
23	09 33 38.28	4.752	16 10 43.5	26.18	3.11	5.86	176 7593	1038.9	17 33.6
24	09 35 32.56	4.771	16 00 12.3	26.43	3.09	5.82	179 2411	1029.2	17 31.5
25	09 37 27.29	4.790	15 49 35.0	26.68	3.08	5.79	181 6997	1019.6	17 29.5
26	09 39 22.47	4.808	15 38 51.8	26.93	3.06	5.76	184 1353	1010.0	17 27.5
27	09 41 18.08	+4.825	+15 28 02.7	-27.17	3.05	5.73	0.186 5480	+1000.6	17 25.5
28	09 43 14.10	4.842	15 17 07.8	27.41	3.03	5.69	188 9382	991.2	17 23.5
29	09 45 10.50	4.858	15 06 07.0	27.65	3.01	5.66	191 3060	981.9	17 21.5
30	09 47 07.29	4.874	14 55 00.5	27.89	3.00	5.63	193 6516	972.8	17 19.5
31	09 49 04.46	4.890	14 43 48.3	28.12	2.98	5.60	195 9754	963.7	17 17.5
June 1	09 51 01.99	+4.905	+14 32 30.5	-28.36	2.96	5.57	0.198 2775	+954.8	17 15.5
2	09 52 59.88	4.919	14 21 07.0	28.60	2.94	5.54	200 5583	945.9	17 13.6
3	09 54 58.11	4.934	14 09 37.8	28.83	2.93	5.52	202 8180	937.1	17 11.6
4	09 56 56.70	4.948	13 58 03.1	29.06	2.92	5.49	205 0566	928.5	17 09.6
5	09 58 55.62	4.962	13 46 22.9	29.29	2.90	5.46	207 2746	919.9	17 07.7
6	10 00 54.88	+4.976	+13 34 37.1	-29.52	2.89	5.43	0.209 4720	+911.3	17 05.8
7	10 02 54.46	4.989	13 22 45.9	29.75	2.87	5.40	211 6489	902.8	17 03.8
8	10 04 54.36	5.002	13 10 49.2	29.98	2.86	5.38	213 8056	894.4	17 01.9
9	10 06 54.58	5.015	12 58 47.1	30.20	2.85	5.35	215 9421	886.0	16 59.9
10	10 08 55.11	5.029	12 46 39.6	30.43	2.84	5.33	218 0585	877.7	16 58.0
11	10 10 55.95	+5.041	+12 34 26.8	-30.64	2.82	5.30	0.220 1551	+869.4	16 56.1
12	10 12 57.09	5.054	12 22 08.7	30.86	2.81	5.27	222 2318	861.2	16 54.2
13	10 14 58.54	5.066	12 09 45.4	31.08	2.80	5.25	224 2887	853.0	16 52.2
14	10 17 00.27	5.078	11 57 16.8	31.30	2.78	5.22	226 3260	844.7	16 50.3
15	10 19 02.30	5.090	11 44 42.9	31.52	2.77	5.20	228 3435	836.5	16 48.4
16	10 21 04.61	+5.103	+11 32 04.0	-31.73	2.76	5.18	0.230 3415	+828.5	16 46.5
17	10 23 07.21	5.114	11 19 20.0	31.94	2.74	5.15	232 3200	820.3	16 44.7
18	10 25 10.08	5.125	11 06 31.0	32.15	2.73	5.13	234 2791	812.2	16 42.8
19	10 27 13.21	5.136	10 53 37.0	32.35	2.72	5.11	236 2188	804.2	16 40.9
20	10 29 16.61	5.147	10 40 38.0	32.55	2.70	5.08	238 1392	796.2	16 39.0
21	10 31 20.27	+5.157	+10 27 34.4	-32.75	2.69	5.06	0.240 0404	+788.2	16 37.1
22	10 33 24.17	5.168	10 14 26.0	32.95	2.68	5.04	241 9226	780.3	16 35.3
23	10 35 28.32	5.178	10 01 12.9	33.14	2.67	5.02	243 7859	772.5	16 33.4
24	10 37 32.72	5.188	9 47 55.3	33.33	2.66	5.00	245 6304	764.7	16 31.5
25	10 39 37.34	5.198	9 34 33.2	33.52	2.65	4.98	247 4563	757.0	16 29.6
26	10 41 42.20	+5.207	+9 21 06.6	-33.70	2.64	4.96	0.249 2639	+749.4	16 27.8
27	10 43 47.28	5.217	9 07 35.7	33.88	2.63	4.94	251 0534	741.9	16 25.9
28	10 45 52.59	5.226	8 54 00.6	34.05	2.62	4.92	252 8249	734.4	16 24.1
29	10 47 58.12	5.235	8 40 21.2	34.23	2.61	4.90	254 5787	727.1	16 22.3
30	10 50 03.88	5.245	8 26 37.6	34.40	2.60	4.88	256 3151	719.8	16 20.4
July 1	10 52 09.86	+5.254	+8 12 50.0	-34.57	2.59	4.86	0.258 0340	+712.6	16 18.6
2	10 54 16.06	+5.263	+7 58 58.4	-34.74	2.57	4.84	0.259 7359	+705.6	16 16.8

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Semi- diam- eter.	Hor. Par.	Log of True Dist. from the Earth.	Var. per Hour.	Meri- dian Passage
July	^{h m s} 10 52 09.86	^s +5.254	^{° ′ ″} + 8 12 50.0	[″] -34.57	[″] 2.59	[″] 4.86	0.258 0340	+ 712.6	^{h m} 16 18.6
2	10 54 16.06	5.263	7 58 58.4	34.74	2.57	4.84	259 7359	705.6	16 16.8
3	10 56 22.49	5.272	7 45 02.6	34.90	2.56	4.82	261 4209	698.6	16 14.9
4	10 58 29.15	5.282	7 31 03.0	35.06	2.55	4.80	263 0891	691.6	16 13.1
5	11 00 36.03	5.291	7 16 59.6	35.23	2.54	4.78	264 7407	684.7	16 11.3
6	11 02 43.14	+5.301	+ 7 02 52.3	-35.36	2.54	4.77	0.266 3758	+ 677.9	16 09.4
7	11 04 50.48	5.311	6 48 41.2	35.54	2.53	4.75	267 9945	671.0	16 07.6
8	11 06 58.06	5.321	6 34 26.4	35.69	2.52	4.73	269 5969	664.3	16 05.8
9	11 09 05.88	5.330	6 20 08.0	35.84	2.51	4.71	271 1831	657.5	16 04.0
10	11 11 13.93	5.340	6 05 46.0	35.99	2.50	4.70	272 7531	650.8	16 02.2
11	11 13 22.21	+5.350	+ 5 51 20.3	-36.14	2.49	4.68	0.274 3071	+ 644.2	16 00.4
12	11 15 30.73	5.360	5 36 51.2	36.28	2.48	4.66	275 8451	637.5	15 58.6
13	11 17 39.50	5.370	5 22 18.8	36.42	2.48	4.65	277 3673	630.9	15 56.8
14	11 19 48.51	5.380	5 07 43.0	36.56	2.47	4.63	278 8736	624.3	15 55.0
15	11 21 57.77	5.391	4 53 03.9	36.70	2.46	4.61	280 3640	617.7	15 53.2
16	11 24 07.27	+5.401	+ 4 38 21.6	-36.83	2.45	4.60	0.281 8387	+ 611.2	15 51.5
17	11 26 17.02	5.411	4 23 36.2	36.95	2.44	4.58	283 2976	604.6	15 49.7
18	11 28 27.02	5.422	4 08 47.8	37.08	2.43	4.57	284 7407	598.0	15 47.9
19	11 30 37.26	5.432	3 53 56.5	37.20	2.42	4.55	286 1682	591.6	15 46.2
20	11 32 47.75	5.442	3 39 02.4	37.31	2.41	4.54	287 5802	585.1	15 44.4
21	11 34 58.49	+5.452	+ 3 24 05.5	-37.43	2.40	4.52	0.288 9768	+ 578.7	15 42.6
22	11 37 09.47	5.463	3 09 06.1	37.53	2.40	4.51	290 3580	572.3	15 40.9
23	11 39 20.70	5.473	2 54 04.1	37.64	2.39	4.49	291 7240	566.0	15 39.1
24	11 41 32.17	5.483	2 38 59.6	37.73	2.38	4.48	293 0749	559.8	15 37.4
25	11 43 43.89	5.494	2 23 52.8	37.83	2.38	4.47	294 4112	553.7	15 35.6
26	11 45 55.87	+5.504	+ 2 08 43.7	-37.92	2.37	4.45	0.295 7328	+ 547.6	15 33.9
27	11 48 08.10	5.515	1 53 32.6	38.01	2.36	4.44	297 0399	541.7	15 32.2
28	11 50 20.59	5.526	1 38 19.3	38.10	2.36	4.43	298 3327	535.7	15 30.4
29	11 52 33.34	5.537	1 23 04.0	38.18	2.35	4.41	299 6113	529.8	15 28.7
30	11 54 46.35	5.548	1 07 46.8	38.26	2.34	4.40	300 8759	524.0	15 27.0
Aug.	11 56 59.64	+5.560	+ 0 52 27.7	-38.33	2.34	4.39	0.302 1267	+ 518.3	15 25.3
1	11 59 13.21	5.571	0 37 06.9	38.40	2.33	4.38	303 3637	512.6	15 23.6
2	12 01 27.05	5.582	0 21 44.4	38.47	2.32	4.36	304 5873	507.0	15 21.9
3	12 03 41.17	5.595	+ 0 06 20.2	38.54	2.32	4.35	305 7974	501.4	15 20.2
4	12 05 55.58	5.607	- 0 09 05.5	38.60	2.31	4.34	306 9942	495.9	15 18.5
5	12 08 10.30	+5.620	+ 0 24 32.6	-38.66	2.31	4.33	0.308 1777	+ 490.4	15 16.8
6	12 10 25.32	5.632	0 40 01.1	38.72	2.30	4.32	309 3480	484.9	15 15.1
7	12 12 40.66	5.645	0 55 31.0	38.77	2.29	4.30	310 5052	479.5	15 13.4
8	12 14 56.30	5.658	1 11 02.1	38.82	2.28	4.29	311 6493	474.0	15 11.7
9	12 17 12.26	5.672	1 26 34.3	38.86	2.28	4.28	312 7804	468.6	15 10.0
10	12 19 28.56	+5.686	+ 1 42 07.6	-38.91	2.27	4.27	0.313 8986	+ 463.2	15 08.4
11	12 21 45.18	5.699	1 57 41.8	38.95	2.27	4.26	315 0038	457.8	15 06.7
12	12 24 02.13	5.714	2 13 16.9	38.98	2.26	4.25	316 0961	452.4	15 05.1
13	12 26 19.43	5.728	2 28 52.8	39.01	2.25	4.24	317 1755	447.1	15 03.4
14	12 28 37.08	5.743	2 44 29.4	39.04	2.25	4.23	318 2421	441.7	15 01.8
15	12 30 55.07	+5.757	+ 3 00 06.5	-39.06	2.24	4.22	0.319 2957	+ 436.3	15 00.1
16	12 33 13.41	+5.772	+ 3 15 44.1	-39.08	2.24	4.21	0.320 3366	+ 431.0	14 58.5

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	^h ^m ^s	^s	[°] ['] ["]	["]	["]	["]			^h ^m
Aug. 16	12 33 13.41	+5.772	- 3 15 44.1	-39.08	2.24	4.21	0.320 3366	+ 431.0	14 58.5
17	12 35 32.11	5.787	3 31 21.9	39.08	2.23	4.20	.321 3646	425.7	14 56.9
18	12 37 51.17	5.802	3 46 59.9	39.09	2.23	4.19	.322 3799	420.5	14 55.3
19	12 40 10.59	5.817	4 02 38.1	39.09	2.22	4.18	.323 3827	415.2	14 53.7
20	12 42 30.36	5.832	4 18 16.1	39.08	2.22	4.17	.324 3729	410.0	14 52.1
21	12 44 50.50	+5.847	- 4 33 54.0	-39.07	2.21	4.16	0.325 3508	+ 404.9	14 50.5
22	12 47 11.02	5.862	4 49 31.5	39.06	2.21	4.15	.326 3165	399.8	14 48.9
23	12 49 31.91	5.878	5 05 08.7	39.04	2.20	4.14	.327 2701	394.9	14 47.3
24	12 51 53.19	5.895	5 20 45.3	39.01	2.20	4.13	.328 2119	390.0	14 45.7
25	12 54 14.85	5.910	5 36 21.3	38.99	2.19	4.12	.329 1420	385.1	14 44.1
26	12 56 36.89	+5.927	- 5 51 56.7	-38.95	2.19	4.12	0.330 0603	+ 380.2	14 42.5
27	12 58 59.34	5.944	6 07 31.1	38.92	2.19	4.11	.330 9672	375.5	14 41.0
28	13 01 22.20	5.961	6 23 04.6	38.88	2.18	4.10	.331 8628	370.8	14 39.4
29	13 03 45.47	5.978	6 38 37.1	38.83	2.18	4.09	.332 7471	366.1	14 37.9
30	13 06 09.16	5.996	6 54 08.4	38.78	2.17	4.08	.333 6201	361.5	14 36.3
31	13 08 33.27	+6.014	- 7 09 38.4	-38.72	2.17	4.07	0.334 4822	+ 356.9	14 34.8
Sept. 1	13 10 57.82	6.032	7 25 07.0	38.66	2.17	4.07	.335 3333	352.4	14 33.3
2	13 13 22.80	6.050	7 40 34.2	38.60	2.16	4.06	.336 1736	347.9	14 31.7
3	13 15 48.23	6.069	7 55 59.8	38.53	2.16	4.05	.337 0031	343.4	14 30.2
4	13 18 14.12	6.088	8 11 23.6	38.46	2.15	4.04	.337 8220	339.0	14 28.7
5	13 20 40.48	+6.108	- 8 26 45.7	-38.38	2.15	4.03	0.338 6301	+ 334.5	14 27.2
6	13 23 07.30	6.127	8 42 05.9	38.30	2.15	4.03	.339 4275	330.1	14 25.7
7	13 25 34.60	6.148	8 57 24.0	38.21	2.14	4.02	.340 2145	325.7	14 24.3
8	13 28 02.39	6.168	9 12 39.9	38.12	2.14	4.01	.340 9909	321.3	14 22.8
9	13 30 30.67	6.188	9 27 53.6	38.02	2.14	4.01	.341 7568	316.9	14 21.3
10	13 32 59.44	+6.209	- 9 43 04.8	-37.91	2.13	4.00	0.342 5122	+ 312.5	14 19.9
11	13 35 28.71	6.230	9 58 13.4	37.80	2.12	3.99	.343 2570	308.1	14 18.4
12	13 37 58.50	6.252	10 13 19.4	37.69	2.12	3.99	.343 9912	303.8	14 17.0
13	13 40 28.79	6.273	10 28 22.5	37.57	2.12	3.98	.344 7150	299.4	14 15.6
14	13 42 59.60	6.295	10 43 22.5	37.44	2.11	3.97	.345 4282	295.0	14 14.1
15	13 45 30.93	+6.316	- 10 58 19.5	-37.30	2.11	3.97	0.346 1310	+ 290.6	14 12.7
16	13 48 02.78	6.338	11 13 13.1	37.17	2.11	3.96	.346 8232	286.3	14 11.3
17	13 50 35.15	6.360	11 28 03.4	37.02	2.10	3.95	.347 5052	282.0	14 09.9
18	13 53 08.06	6.383	11 42 49.9	36.86	2.10	3.95	.348 1771	277.8	14 08.5
19	13 55 41.51	6.405	11 57 32.7	36.70	2.09	3.94	.348 8389	273.7	14 07.1
20	13 58 15.49	+6.427	- 12 12 11.6	-36.54	2.09	3.94	0.349 4908	+ 269.6	14 05.8
21	14 00 50.01	6.450	12 26 46.4	36.36	2.09	3.93	.350 1330	265.5	14 04.4
22	14 03 25.07	6.473	12 41 16.9	36.18	2.08	3.92	.350 7655	261.5	14 03.0
23	14 06 00.70	6.496	12 55 43.2	36.00	2.08	3.92	.351 3883	257.5	14 01.7
24	14 08 36.89	6.520	13 10 05.0	35.81	2.08	3.91	.352 0018	253.7	14 00.4
25	14 11 13.64	+6.543	- 13 24 22.0	-35.61	2.08	3.91	0.352 6060	+ 249.8	13 59.1
26	14 13 50.96	6.567	13 38 34.3	35.41	2.07	3.90	.353 2011	246.0	13 57.8
27	14 16 28.87	6.592	13 52 41.7	35.20	2.07	3.90	.353 7870	242.2	13 56.5
28	14 19 07.35	6.615	14 06 44.0	34.99	2.07	3.89	.354 3640	238.5	13 55.2
29	14 21 46.42	6.640	14 20 41.1	34.77	2.07	3.89	.354 9320	234.8	13 53.9
30	14 24 26.09	+6.665	- 14 34 32.9	-34.54	2.06	3.88	0.355 4912	+ 231.2	13 52.6
Oct. 1	14 27 06.36	+6.691	- 14 48 19.1	-34.31	2.06	3.88	0.356 0416	+ 227.5	13 51.3

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Semi- diam- eter.	Hor. Par.	Log of True Dist. from the Earth.	Var. per Hour.	Meri- dian Passage
Oct.	1 ^{h m s} 14 27 06.36	+6.691	14 48 19.1	-34.31	2.06	3.88	0.356 0416	+ 227.5	13 51.3
	2 14 29 47.24	6.716	15 01 59.7	34.07	2.06	3.87	.356 5833	223.9	13 50.1
	3 14 32 28.74	6.742	15 15 34.5	33.83	2.06	3.87	.357 1164	220.3	13 48.8
	4 14 35 10.85	6.767	15 29 03.2	33.57	2.05	3.86	.357 6409	216.8	13 47.6
	5 14 37 53.59	6.794	15 42 25.9	33.32	2.05	3.86	.358 1569	213.2	13 46.4
	6 14 40 36.96	+6.820	-15 55 42.3	-33.05	2.05	3.85	0.358 6644	+ 209.7	13 45.2
	7 14 43 20.96	6.847	16 08 52.3	32.78	2.05	3.85	.359 1634	206.1	13 44.0
	8 14 46 05.61	6.873	16 21 55.6	32.50	2.04	3.84	.359 6539	202.6	13 42.8
	9 14 48 50.89	6.900	16 34 52.2	32.21	2.04	3.84	.360 1360	199.1	13 41.6
	10 14 51 36.82	6.927	16 47 41.8	31.92	2.04	3.84	.360 6096	195.5	13 40.4
	11 14 54 23.40	+6.954	-17 00 24.4	-31.62	2.04	3.83	0.361 0745	+ 192.0	13 39.2
	12 14 57 10.62	6.981	17 12 59.7	31.31	2.04	3.83	.361 5310	188.4	13 38.1
	13 14 59 58.50	7.008	17 25 27.4	31.00	2.03	3.82	.361 9790	185.0	13 37.0
	14 15 02 47.02	7.035	17 37 47.5	30.68	2.03	3.82	.362 4186	181.4	13 35.8
	15 15 05 36.20	7.062	17 49 59.7	30.34	2.03	3.82	.362 8499	178.0	13 34.7
	16 15 08 26.02	+7.090	-18 02 03.9	-30.00	2.03	3.81	0.363 2730	+ 174.6	13 33.6
	17 15 11 16.49	7.116	18 13 59.8	29.66	2.03	3.81	.363 6878	171.2	13 32.5
	18 15 14 07.61	7.144	18 25 47.4	29.30	2.03	3.81	.364 0946	167.8	13 31.4
	19 15 16 59.38	7.170	18 37 26.4	28.95	2.02	3.80	.364 4935	164.6	13 30.4
	20 15 19 51.80	7.198	18 48 56.7	28.58	2.02	3.80	.364 8846	161.3	13 29.3
	21 15 22 44.86	+7.225	-19 00 18.0	-28.20	2.02	3.79	0.365 2679	+ 158.1	13 28.3
	22 15 25 38.58	7.252	19 11 30.3	27.82	2.02	3.79	.365 6437	155.0	13 27.2
	23 15 28 32.95	7.279	19 22 33.4	27.43	2.02	3.79	.366 0121	152.0	13 26.2
	24 15 31 27.97	7.306	19 33 27.0	27.04	2.02	3.79	.366 3731	148.9	13 25.2
	25 15 34 23.63	7.333	19 44 11.0	26.63	2.01	3.78	.366 7269	145.9	13 24.2
	26 15 37 19.95	+7.360	-19 54 45.2	-26.22	2.01	3.78	0.367 0735	+ 143.0	13 23.2
	27 15 40 16.92	7.387	20 05 09.5	25.80	2.01	3.78	.367 4131	140.0	13 22.2
	28 15 43 14.54	7.415	20 15 23.7	25.38	2.01	3.77	.367 7458	137.2	13 21.2
	29 15 46 12.81	7.441	20 25 27.7	24.95	2.01	3.77	.368 0717	134.3	13 20.2
	30 15 49 11.73	7.469	20 35 21.2	24.51	2.01	3.77	.368 3906	131.5	13 19.3
	31 15 52 11.30	+7.495	-20 45 04.1	-24.07	2.00	3.76	0.368 7029	+ 128.7	13 18.3
Nov.	1 15 55 11.52	7.522	20 54 36.4	23.62	2.00	3.76	.369 0084	125.9	13 17.4
	2 15 58 12.38	7.550	21 03 57.6	23.15	2.00	3.76	.369 3073	123.1	13 16.5
	3 16 01 13.90	7.577	21 13 07.8	22.69	2.00	3.76	.369 5995	120.4	13 15.6
	4 16 04 16.06	7.603	21 22 06.6	22.21	2.00	3.75	.369 8853	117.7	13 14.7
	5 16 07 18.85	+7.630	-21 30 53.9	-21.73	2.00	3.75	0.370 1644	+ 114.9	13 13.8
	6 16 10 22.28	7.656	21 39 29.7	21.25	2.00	3.75	.370 4369	112.2	13 12.9
	7 16 13 26.33	7.683	21 47 53.7	20.75	2.00	3.75	.370 7028	109.4	13 12.0
	8 16 16 31.02	7.708	21 56 05.7	20.25	2.00	3.75	.370 9621	106.7	13 11.2
	9 16 19 36.31	7.733	22 04 05.6	19.74	1.99	3.74	.371 2148	103.9	13 10.3
	10 16 22 42.22	+7.759	-22 11 53.3	-19.23	1.99	3.74	0.371 4609	+ 101.1	13 09.5
	11 16 25 48.73	7.784	22 19 28.4	18.70	1.99	3.74	.371 7004	98.5	13 08.6
	12 16 28 55.84	7.808	22 26 50.8	18.17	1.99	3.74	.371 9334	95.7	13 07.8
	13 16 32 03.52	7.832	22 34 00.5	17.63	1.99	3.73	.372 1600	93.1	13 07.0
	14 16 35 11.78	7.856	22 40 57.1	17.09	1.99	3.73	.372 3803	90.5	13 06.2
	15 16 38 20.60	+7.879	-22 47 40.6	-16.54	1.99	3.73	0.372 5944	+ 87.9	13 05.4
	16 16 41 29.97	+7.902	-22 54 10.8	-15.98	1.99	3.73	0.372 8024	+ 85.4	13 04.7

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Semi- liam- eter.	Hor. Par.	Log of True Dist. from the Earth.	Var. per Hour.	Meri- dian Passage
Nov. 16	^h 16 ^m 41 ^s 29.97	^s +7.902	[°] -22 ['] 54 ["] 10.8	["] -15.98	["] 1.99	3.73	0.372 8024	+	^h 85.4 ^m 13 04.7
17	16 44 39.88	7.924	23 00 27.6	15.42	1.99	3.73	.373 0043		82.9 13 03.9
18	16 47 50.33	7.946	23 06 30.8	14.85	1.99	3.73	.373 2004		80.5 13 03.1
19	16 51 01.30	7.968	23 12 20.3	14.27	1.98	3.72	.373 3906		78.0 13 02.4
20	16 54 12.79	7.989	23 17 55.8	13.69	1.98	3.72	.373 5751		75.7 13 01.6
21	16 57 24.78	+8.010	-23 23 17.4	-13.10	1.98	3.72	0.373 7541	+	73.4 13 00.9
22	17 00 37.26	8.030	23 28 24.9	12.52	1.98	3.72	.373 9276		71.1 13 00.2
23	17 03 50.22	8.050	23 33 18.1	11.92	1.98	3.72	.374 0957		68.9 12 59.4
24	17 07 03.65	8.069	23 37 56.9	11.32	1.98	3.72	.374 2585		66.8 12 58.7
25	17 10 17.55	8.089	23 42 21.2	10.71	1.98	3.72	.374 4162		64.7 12 58.0
26	17 13 31.90	+8.107	-23 46 30.9	-10.10	1.98	3.71	0.374 5689	+	62.6 12 57.3
27	17 16 46.69	8.125	23 50 25.8	9.48	1.98	3.71	.374 7166		60.5 12 56.6
28	17 20 01.91	8.143	23 54 05.9	8.86	1.98	3.71	.374 8593		58.5 12 55.9
29	17 23 17.55	8.160	23 57 30.9	8.23	1.98	3.71	.374 9973		56.5 12 55.3
30	17 26 33.60	8.177	24 00 40.8	7.60	1.98	3.71	.375 1304		54.5 12 54.6
Dec. 1	17 29 50.04	+8.193	-24 03 35.6	-6.97	1.98	3.71	0.375 2587	+	52.5 12 53.9
2	17 33 06.86	8.209	24 06 15.1	6.33	1.98	3.71	.375 3824		50.5 12 53.3
3	17 36 24.06	8.224	24 08 39.2	5.68	1.98	3.71	.375 5012		48.5 12 52.6
4	17 39 41.61	8.238	24 10 47.7	5.03	1.97	3.70	.375 6152		46.5 12 52.0
5	17 42 59.50	8.253	24 12 40.8	4.38	1.97	3.70	.375 7245		44.5 12 51.3
6	17 46 17.72	+8.266	-24 14 18.1	-3.73	1.97	3.70	0.375 8290	+	42.5 12 50.7
7	17 49 36.25	8.278	24 15 39.7	3.07	1.97	3.70	.375 9287		40.6 12 50.1
8	17 52 55.08	8.290	24 16 45.4	2.41	1.97	3.70	.376 0239		38.7 12 49.4
9	17 56 14.19	8.302	24 17 35.2	1.74	1.97	3.70	.376 1143		36.7 12 48.8
10	17 59 33.55	8.312	24 18 09.1	1.08	1.97	3.70	.376 2000		34.8 12 48.2
11	18 02 53.16	+8.322	-24 18 26.9	-0.41	1.97	3.70	0.376 2811	+	32.8 12 47.6
12	18 06 12.99	8.330	24 18 28.6	+0.27	1.97	3.70	.376 3576		31.0 12 47.0
13	18 09 33.02	8.339	24 18 14.2	0.94	1.97	3.70	.376 4297		29.1 12 46.4
14	18 12 53.24	8.346	24 17 43.6	1.61	1.97	3.70	.376 4974		27.3 12 45.8
15	18 16 13.63	8.353	24 16 56.7	2.29	1.97	3.70	.376 5607		25.5 12 45.2
16	18 19 34.16	+8.358	-24 15 53.6	+2.97	1.97	3.70	0.376 6198	+	23.7 12 44.6
17	18 22 54.83	8.364	24 14 34.3	3.64	1.97	3.70	.376 6748		22.1 12 44.0
18	18 26 15.63	8.369	24 12 58.7	4.33	1.97	3.70	.376 7258		20.5 12 43.4
19	18 29 36.52	8.372	24 11 06.8	5.00	1.97	3.70	.376 7730		18.9 12 42.8
20	18 32 57.50	8.375	24 08 58.5	5.69	1.96	3.69	.376 8164		17.3 12 42.2
21	18 36 18.54	+8.378	-24 06 33.8	+6.37	1.96	3.69	0.376 8561	+	15.8 12 41.6
22	18 39 39.64	8.380	24 03 52.9	7.05	1.96	3.69	.376 8924		14.4 12 41.0
23	18 43 00.77	8.381	24 00 55.7	7.72	1.96	3.69	.376 9252		13.0 12 40.4
24	18 46 21.92	8.382	23 57 42.2	8.40	1.96	3.69	.376 9546		11.6 12 39.8
25	18 49 43.08	8.382	23 54 12.4	9.08	1.96	3.69	.376 9808		10.2 12 39.2
26	18 53 04.24	+8.381	-23 50 26.3	+9.76	1.96	3.69	0.377 0037	+	8.9 12 38.6
27	18 56 25.37	8.380	23 46 24.0	10.43	1.96	3.69	.377 0234		7.6 12 38.0
28	18 59 46.48	8.378	23 42 05.5	11.11	1.96	3.69	.377 0402		6.3 12 37.4
29	19 03 07.53	8.376	23 37 30.8	11.78	1.96	3.69	.377 0538		5.0 12 36.9
30	19 06 28.52	8.373	23 32 40.0	12.45	1.96	3.69	.377 0644		3.8 12 36.3
31	19 09 49.44	+8.370	-23 27 33.0	+13.13	1.96	3.69	0.377 0720	+	2.5 12 35.7
32	19 13 10.26	+8.365	-23 22 09.9	+13.80	1.96	3.69	0.377 0766	+	1.3 12 35.1

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Jan.	^h ^m ^s	^s	[°] ['] [″]	[″]	[″]	[″]			^h ^m
1	07 10 32.21	-1.434	+22 36 29.8	+2.78	21.81	2.09	0.624 7720	- 63.1	00 31.7
2	07 09 57.74	1.439	22 37 36.3	2.76	21.81	2.09	0.624 6367	49.6	00 27.2
3	07 09 23.13	1.444	22 38 42.4	2.75	21.82	2.09	0.624 5339	36.0	00 22.7
4	07 08 48.42	1.448	22 39 48.2	2.73	21.82	2.09	0.624 4637	22.5	00 18.2
5	07 08 13.64	1.450	22 40 53.6	2.71	21.82	2.09	0.624 4261	- 8.9	00 13.7
6	07 07 38.81	-1.452	+22 41 58.5	+2.70	21.82	2.09	0.624 4211	+ 4.7	00 09.2
7	07 07 03.95	1.453	22 43 03.0	2.68	21.82	2.09	0.624 4487	18.3	00 04.7
8	07 06 29.09	1.452	22 44 06.9	2.65	21.82	2.09	0.624 5091	31.9	00 00.2
9	07 05 54.26	1.450	22 45 10.2	2.63	21.82	2.09	0.624 6022	45.6	23 51.2
10	07 05 19.48	1.448	22 46 13.0	2.60	21.81	2.09	0.624 7280	59.2	23 46.6
11	07 04 44.77	-1.444	+22 47 15.0	+2.57	21.80	2.09	0.624 8864	+ 72.8	23 42.1
12	07 04 10.16	1.439	22 48 16.4	2.54	21.79	2.09	0.625 0774	86.4	23 37.6
13	07 03 35.69	1.433	22 49 17.0	2.51	21.78	2.08	0.625 3009	99.9	23 33.1
14	07 03 01.38	1.426	22 50 16.9	2.48	21.77	2.08	0.625 5567	113.3	23 28.6
15	07 02 27.25	1.418	22 51 16.0	2.44	21.75	2.08	0.625 8448	126.7	23 24.1
16	07 01 53.33	-1.408	+22 52 14.2	+2.41	21.74	2.08	0.626 1650	+140.0	23 19.6
17	07 01 19.65	1.398	22 53 11.6	2.37	21.72	2.08	0.626 5170	153.3	23 15.1
18	07 00 46.23	1.387	22 54 08.0	2.33	21.70	2.08	0.626 9009	166.5	23 10.7
19	07 00 13.10	1.374	22 55 03.6	2.30	21.68	2.08	0.627 3161	179.5	23 06.2
20	06 59 40.30	1.360	22 55 58.2	2.25	21.66	2.07	0.627 7624	192.4	23 01.7
21	06 59 07.83	-1.345	+22 56 51.8	+2.21	21.63	2.07	0.628 2395	+205.1	22 57.3
22	06 58 35.74	1.329	22 57 44.5	2.17	21.61	2.07	0.628 7470	217.7	22 52.8
23	06 58 04.04	1.312	22 58 36.2	2.13	21.58	2.07	0.629 2847	230.2	22 48.4
24	06 57 32.76	1.294	22 59 26.8	2.09	21.55	2.06	0.629 8520	242.5	22 43.9
25	06 57 01.91	1.276	23 00 16.3	2.04	21.52	2.06	0.630 4487	254.6	22 39.5
26	06 56 31.52	-1.256	+23 01 04.8	+2.00	21.49	2.06	0.631 0741	+266.5	22 35.0
27	06 56 01.62	1.235	23 01 52.1	1.95	21.46	2.05	0.631 7281	278.3	22 30.6
28	06 55 32.23	1.214	23 02 38.4	1.90	21.43	2.05	0.632 4101	289.9	22 26.2
29	06 55 03.36	1.192	23 03 23.5	1.86	21.39	2.05	0.633 1195	301.2	22 21.8
30	06 54 35.03	1.169	23 04 07.6	1.81	21.36	2.04	0.633 8559	312.4	22 17.4
Feb.									
31	06 54 07.27	-1.145	+23 04 50.5	+1.76	21.32	2.04	0.634 6188	+323.3	22 13.0
1	06 53 40.09	1.120	23 05 32.3	1.72	21.28	2.04	0.635 4078	334.1	22 08.7
2	06 53 13.50	1.095	23 06 13.0	1.67	21.24	2.03	0.636 2223	344.6	22 04.3
3	06 52 47.53	1.069	23 06 52.5	1.62	21.20	2.03	0.637 0617	354.9	22 00.0
4	06 52 22.18	1.043	23 07 30.9	1.58	21.16	2.03	0.637 9257	365.0	21 55.6
5	06 51 57.48	-1.015	+23 08 08.2	+1.53	21.11	2.02	0.638 8138	+374.9	21 51.3
6	06 51 33.44	0.988	23 08 44.3	1.48	21.07	2.02	0.639 7254	384.0	21 47.0
7	06 51 10.07	0.959	23 09 19.3	1.44	21.02	2.01	0.640 6599	394.0	21 42.7
8	06 50 47.39	0.930	23 09 53.2	1.39	20.98	2.01	0.641 6168	403.3	21 38.4
9	06 50 25.41	0.901	23 10 25.9	1.34	20.93	2.00	0.642 5958	412.4	21 34.1
10	06 50 04.15	-0.871	+23 10 57.6	+1.30	20.88	2.00	0.643 5963	+421.2	21 29.8
11	06 49 43.62	0.840	23 11 28.1	1.25	20.83	1.99	0.644 6177	429.8	21 25.6
12	06 49 23.83	0.809	23 11 57.5	1.20	20.78	1.99	0.645 6594	438.2	21 21.3
13	06 49 04.80	0.777	23 12 25.8	1.16	20.73	1.98	0.646 7209	446.3	21 17.1
14	06 48 46.53	0.745	23 12 53.0	1.11	20.68	1.98	0.647 8015	454.1	21 12.8
15	06 48 29.05	-0.712	+23 13 19.1	+1.06	20.63	1.97	0.648 9007	+461.8	21 08.6
16	06 48 12.35	-0.679	+23 13 44.1	+1.02	20.58	1.97	0.650 0181	+469.2	21 04.4

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Polar S.D.	Hor. Par.	Log of True Dist. from the Earth.	Var. per Hour.	Meri- dian Passage
	^h ^m ^s	^s	[°] ['] ["]	["]	[°] [']	["]		^s	^h ^m
Feb. 16	06 48 12.35	- 0.679	+23 13 44.1	+ 1.02	20.58	1.97	0.6500181	+ 469.2	21 04.4
17	06 47 56.45	0.646	23 14 08.0	0.97	20.52	1.96	0.6511528	476.3	21 00.3
18	06 47 41.35	0.612	23 14 30.8	0.93	20.47	1.96	0.6523043	483.2	20 56.1
19	06 47 27.08	0.578	23 14 52.5	0.88	20.41	1.95	0.6534720	489.8	20 51.9
20	06 47 13.63	0.543	23 15 13.2	0.84	20.36	1.95	0.6546554	496.2	20 47.8
21	06 47 01.01	- 0.509	+23 15 32.7	+ 0.79	20.30	1.94	0.6558536	+ 502.2	20 43.6
22	06 46 49.22	0.474	23 15 51.2	0.75	20.24	1.94	0.6570661	508.1	20 39.5
23	06 46 38.28	0.438	23 16 08.7	0.71	20.19	1.93	0.6582924	513.7	20 35.4
24	06 46 28.19	0.403	23 16 25.1	0.66	20.13	1.93	0.6595318	519.0	20 31.3
25	06 46 18.95	0.368	23 16 40.4	0.62	20.07	1.92	0.6607836	524.1	20 27.3
26	06 46 10.55	- 0.332	+23 16 54.7	+ 0.58	20.01	1.92	0.6620473	+ 528.9	20 23.2
27	06 46 03.01	0.296	23 17 08.0	0.53	19.95	1.91	0.6633224	533.5	20 19.2
28	06 45 56.32	0.261	23 17 20.2	0.49	19.90	1.90	0.6646081	537.8	20 15.1
Mar. 1	06 45 50.49	0.225	23 17 31.5	0.45	19.84	1.90	0.6659039	541.9	20 11.1
2	06 45 45.52	0.189	23 17 41.7	0.40	19.78	1.89	0.6672093	545.8	20 07.1
3	06 45 41.40	- 0.154	+23 17 50.9	+ 0.36	19.72	1.89	0.6685237	+ 549.4	20 03.1
4	06 45 38.13	0.118	23 17 59.2	0.32	19.66	1.88	0.6698466	552.9	19 59.1
5	06 45 35.72	0.082	23 18 06.4	0.28	19.60	1.88	0.6711775	556.1	19 55.2
6	06 45 34.17	0.047	23 18 12.6	0.24	19.54	1.87	0.6725159	559.1	19 51.2
7	06 45 33.46	- 0.012	23 18 17.8	0.20	19.48	1.86	0.6738614	562.0	19 47.3
8	06 45 33.61	+ 0.024	+23 18 22.1	+ 0.16	19.42	1.86	0.6752134	+ 564.6	19 43.4
9	06 45 34.61	0.059	23 18 25.4	0.12	19.36	1.85	0.6765714	567.0	19 39.5
10	06 45 36.46	0.095	23 18 27.8	0.08	19.29	1.85	0.6779350	569.3	19 35.6
11	06 45 39.16	0.130	23 18 29.2	+ 0.04	19.23	1.84	0.6793038	571.3	19 31.7
12	06 45 42.71	0.165	23 18 29.6	0.00	19.17	1.84	0.6806771	573.1	19 27.8
13	06 45 47.10	+ 0.200	+23 18 29.0	+ 0.05	19.11	1.83	0.6820545	+ 574.7	19 24.0
14	06 45 52.32	0.235	23 18 27.4	0.09	19.05	1.82	0.6834356	576.1	19 20.2
15	06 45 58.39	0.270	23 18 24.9	0.13	18.99	1.82	0.6848200	577.4	19 16.4
16	06 46 05.29	0.305	23 18 21.4	0.17	18.93	1.82	0.6862070	578.4	19 12.6
17	06 46 13.02	0.339	23 18 16.9	0.21	18.87	1.81	0.6875963	579.2	19 08.8
18	06 46 21.58	+ 0.374	+23 18 11.4	+ 0.25	18.81	1.80	0.6889873	+ 579.9	19 05.0
19	06 46 30.97	0.408	23 18 05.0	0.29	18.75	1.80	0.6903797	580.4	19 01.2
20	06 46 41.17	0.442	23 17 57.6	0.33	18.69	1.79	0.6917730	580.6	18 57.5
21	06 46 52.19	0.476	23 17 49.2	0.37	18.63	1.78	0.6931668	580.7	18 53.7
22	06 47 04.02	0.510	23 17 39.8	0.41	18.57	1.78	0.6945605	580.6	18 50.0
23	06 47 16.65	+ 0.543	+23 17 29.4	+ 0.45	18.51	1.77	0.6959538	+ 580.3	18 46.3
24	06 47 30.09	0.576	23 17 18.0	0.50	18.45	1.77	0.6973461	579.9	18 42.6
25	06 47 44.31	0.609	23 17 05.6	0.54	18.39	1.76	0.6987371	579.2	18 38.9
26	06 47 59.31	0.641	23 16 52.2	0.58	18.33	1.76	0.7001264	578.5	18 35.2
27	06 48 15.08	0.673	23 16 37.7	0.63	18.27	1.75	0.7015137	577.6	18 31.6
28	06 48 31.63	+ 0.705	+23 16 22.2	+ 0.67	18.22	1.74	0.7028987	+ 576.5	18 27.9
29	06 48 48.94	0.737	23 16 05.7	0.71	18.16	1.74	0.7042809	575.2	18 24.3
30	06 49 06.99	0.768	23 15 48.2	0.75	18.10	1.73	0.7056599	573.9	18 20.7
31	06 49 25.79	0.799	23 15 29.6	0.80	18.04	1.73	0.7070354	572.4	18 17.1
Apr. 1	06 49 45.33	0.829	23 15 09.9	0.84	17.98	1.72	0.7084072	570.7	18 13.5
2	06 50 05.59	+ 0.859	+23 14 49.2	+ 0.88	17.93	1.72	0.7097749	+ 569.0	18 09.9
3	06 50 26.57	+ 0.889	+23 14 27.5	+ 0.92	17.87	1.71	0.7111384	+ 567.2	18 06.3

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Polar S.D.	Hor. Par.	Log of True Dist. from the Earth.	Var. per Hour.	Meri- dian Passage
Apr. 1	^h 06 ^m 49 ^s 45.33	+0.829	+23 15 09.9	-0.84	17.98	1.72	0.708 4072	+570.7	^h 18 ^m 13.5
2	06 50 05.59	0.859	23 14 49.2	0.88	17.93	1.72	.709 7749	569.0	18 09.9
3	06 50 26.57	0.889	23 14 27.5	0.92	17.87	1.71	.711 1384	567.2	18 06.3
4	06 50 48.25	0.918	23 14 04.8	0.97	17.82	1.71	.712 4973	565.2	18 02.7
5	06 51 10.64	0.948	23 13 41.0	1.01	17.76	1.70	.713 8513	563.1	17 59.2
6	06 51 33.73	+0.977	+23 13 16.1	-1.06	17.71	1.70	0.715 2002	+560.9	17 55.6
7	06 51 57.52	1.005	23 12 50.2	1.10	17.65	1.69	.716 5437	558.7	17 52.1
8	06 52 21.99	1.034	23 12 23.1	1.15	17.60	1.68	.717 8818	556.3	17 48.6
9	06 52 47.13	1.061	23 11 55.0	1.20	17.55	1.68	.719 2139	553.8	17 45.1
10	06 53 12.93	1.089	23 11 25.7	1.24	17.49	1.67	.720 5399	551.2	17 41.6
11	06 53 39.40	+1.116	+23 10 55.3	-1.29	17.44	1.67	0.721 8595	+548.5	17 38.1
12	06 54 06.52	1.144	23 10 23.8	1.34	17.39	1.66	.723 1725	545.6	17 34.6
13	06 54 34.29	1.171	23 09 51.1	1.39	17.33	1.66	.724 4786	542.7	17 31.2
14	06 55 02.71	1.197	23 09 17.2	1.44	17.28	1.65	.725 7774	539.6	17 27.7
15	06 55 31.75	1.223	23 08 42.2	1.48	17.23	1.65	.727 0689	536.5	17 24.3
16	06 56 01.41	+1.249	+23 08 06.1	-1.53	17.18	1.64	0.728 3527	+533.3	17 20.8
17	06 56 31.70	1.275	23 07 28.8	1.58	17.13	1.64	.729 6287	530.0	17 17.4
18	06 57 02.60	1.300	23 06 50.2	1.63	17.08	1.64	.730 8966	526.5	17 14.0
19	06 57 34.09	1.325	23 06 10.4	1.68	17.03	1.63	.732 1561	523.0	17 10.6
20	06 58 06.18	1.349	23 05 29.4	1.74	16.98	1.63	.733 4070	519.4	17 07.2
21	06 58 38.85	+1.373	+23 04 47.1	-1.79	16.93	1.62	0.734 6490	+515.6	17 03.8
22	06 59 12.09	1.397	23 04 03.6	1.84	16.88	1.62	.735 8821	511.9	17 00.4
23	06 59 45.90	1.420	23 03 18.9	1.89	16.84	1.61	.737 1060	508.0	16 57.1
24	07 00 20.26	1.443	23 02 33.0	1.94	16.79	1.61	.738 3205	504.1	16 53.7
25	07 00 55.16	1.465	23 01 45.7	2.00	16.74	1.60	.739 5255	500.1	16 50.4
26	07 01 30.60	+1.488	+23 00 57.2	-2.05	16.70	1.60	0.740 7209	+496.0	16 47.0
27	07 02 06.57	1.510	23 00 07.3	2.10	16.65	1.59	.741 9064	491.9	16 43.7
28	07 02 43.06	1.531	22 59 16.2	2.16	16.61	1.59	.743 0820	487.7	16 40.4
29	07 03 20.06	1.552	22 58 23.7	2.21	16.56	1.59	.744 2475	483.5	16 37.1
30	07 03 57.56	1.573	22 57 30.0	2.26	16.52	1.58	.745 4027	479.1	16 33.8
May 1	07 04 35.56	+1.593	+22 56 35.0	-2.32	16.47	1.58	0.746 5474	+474.8	16 30.5
2	07 05 14.04	1.613	22 55 38.7	2.37	16.43	1.57	.747 6816	470.4	16 27.2
3	07 05 53.00	1.633	22 54 41.0	2.43	16.39	1.57	.748 8052	465.9	16 23.9
4	07 06 32.43	1.653	22 53 42.0	2.49	16.35	1.57	.749 9181	461.5	16 20.6
5	07 07 12.32	1.672	22 52 41.6	2.54	16.31	1.56	.751 0204	457.1	16 17.4
6	07 07 52.67	+1.691	+22 51 39.9	-2.60	16.27	1.56	0.752 1120	+452.5	16 14.1
7	07 08 33.47	1.709	22 50 36.8	2.66	16.22	1.55	.753 1926	448.0	16 10.9
8	07 09 14.70	1.727	22 49 32.3	2.72	16.18	1.55	.754 2622	443.3	16 07.6
9	07 09 56.37	1.745	22 48 26.4	2.77	16.15	1.55	.755 3206	438.6	16 04.4
10	07 10 38.47	1.763	22 47 19.2	2.83	16.11	1.54	.756 3676	433.9	16 01.2
11	07 11 20.99	+1.780	+22 46 10.5	-2.89	16.07	1.54	0.757 4031	+429.1	15 57.9
12	07 12 03.93	1.797	22 45 00.4	2.95	16.03	1.53	.758 4272	424.3	15 54.7
13	07 12 47.27	1.814	22 43 48.9	3.01	15.99	1.53	.759 4395	419.4	15 51.5
14	07 13 31.02	1.831	22 42 36.0	3.07	15.96	1.53	.760 4401	414.5	15 48.3
15	07 14 15.16	1.847	22 41 21.6	3.13	15.92	1.52	.761 4289	409.5	15 45.1
16	07 14 59.68	+1.863	+22 40 05.8	-3.19	15.88	1.52	0.762 4058	+404.5	15 41.9
17	07 15 44.58	+1.879	+22 38 48.5	-3.25	15.85	1.52	0.763 3706	+399.4	15 38.7

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Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Polar S.D.	Hor. Par.	Log of True Dist. from the Earth.	Var. per Hour.	Meri- dian Passage
	^h ^m ^s	^s	[°] ['] ["]	["]	[°] ['] ["]	["]			^h ^m
May 17	07 15 44.58	+1.879	+22 38 48.5	-3.25	15.85	1.52	0.763 3706	+399.4	15 38.7
18	07 16 29.85	1.894	22 37 29.7	3.31	15.81	1.51	.764 3231	394.3	15 35.6
19	07 17 15.48	1.909	22 36 09.5	3.37	15.78	1.51	.765 2634	389.2	15 32.4
20	07 18 01.46	1.923	22 34 47.9	3.43	15.75	1.51	.766 1913	384.0	15 29.2
21	07 18 47.79	1.937	22 33 24.7	3.50	15.71	1.50	.767 1066	378.8	15 26.1
22	07 19 34.45	+1.951	+22 32 00.1	-3.56	15.68	1.50	0.768 0095	+373.6	15 22.9
23	07 20 21.45	1.965	22 30 33.9	3.62	15.65	1.50	.768 8998	368.3	15 19.8
24	07 21 08.77	1.978	22 29 06.3	3.68	15.62	1.50	.769 7774	363.0	15 16.6
25	07 21 56.41	1.991	22 27 37.3	3.74	15.59	1.49	.770 6422	357.7	15 13.5
26	07 22 44.35	2.004	22 26 06.7	3.80	15.56	1.49	.771 4944	352.4	15 10.3
27	07 23 32.59	+2.016	+22 24 34.7	-3.86	15.53	1.49	0.772 3338	+347.1	15 07.2
28	07 24 21.12	2.028	22 23 01.2	3.93	15.50	1.48	.773 1603	341.7	15 04.1
29	07 25 09.94	2.040	22 21 26.2	3.99	15.47	1.48	.773 9740	336.4	15 01.0
30	07 25 59.03	2.051	22 19 49.7	4.05	15.44	1.48	.774 7748	331.0	14 57.9
31	07 26 48.40	2.062	22 18 11.7	4.11	15.41	1.48	.775 5628	325.6	14 54.8
June 1	07 27 38.03	+2.073	+22 16 32.2	-4.18	15.38	1.47	0.776 3379	+320.3	14 51.7
2	07 28 27.92	2.084	22 14 51.2	4.24	15.36	1.47	.777 1001	314.9	14 48.6
3	07 29 18.06	2.095	22 13 08.7	4.30	15.33	1.47	.777 8493	309.5	14 45.5
4	07 30 08.46	2.105	22 11 24.7	4.36	15.30	1.47	.778 5855	304.0	14 42.4
5	07 30 59.09	2.115	22 09 39.3	4.43	15.28	1.46	.779 3086	298.6	14 39.3
6	07 31 49.97	+2.125	+22 07 52.3	-4.49	15.25	1.46	0.780 0187	+293.1	14 36.2
7	07 32 41.08	2.134	22 06 03.8	4.55	15.23	1.46	.780 7155	287.6	14 33.1
8	07 33 32.42	2.144	22 04 13.8	4.61	15.20	1.46	.781 3992	282.1	14 30.0
9	07 34 23.97	2.153	22 02 22.4	4.67	15.18	1.45	.782 0696	276.6	14 26.9
10	07 35 15.74	2.161	22 00 29.4	4.74	15.16	1.45	.782 7267	271.0	14 23.9
11	07 36 07.72	+2.170	+21 58 34.9	-4.80	15.14	1.45	0.783 3705	+265.5	14 20.8
12	07 36 59.91	2.178	21 56 38.9	4.86	15.11	1.45	.784 0009	259.9	14 17.7
13	07 37 52.28	2.186	21 54 41.5	4.93	15.09	1.44	.784 6179	254.3	14 14.7
14	07 38 44.85	2.194	21 52 42.5	4.99	15.07	1.44	.785 2213	248.6	14 11.6
15	07 39 37.60	2.202	21 50 42.0	5.05	15.05	1.44	.785 8113	243.0	14 08.6
16	07 40 30.54	+2.209	+21 48 40.0	-5.11	15.03	1.44	0.786 3877	+237.3	14 05.5
17	07 41 23.64	2.216	21 46 36.6	5.18	15.01	1.44	.786 9504	231.6	14 02.5
18	07 42 16.91	2.223	21 44 31.6	5.24	14.99	1.44	.787 4994	225.9	13 59.4
19	07 43 10.34	2.229	21 42 25.2	5.30	14.97	1.43	.788 0347	220.2	13 56.4
20	07 44 03.92	2.235	21 40 17.3	5.36	14.96	1.43	.788 5562	214.4	13 53.4
21	07 44 57.64	+2.241	+21 38 07.9	-5.42	14.94	1.43	0.789 0640	+208.7	13 50.3
22	07 45 51.50	2.247	21 35 57.1	5.48	14.92	1.43	.789 5580	203.0	13 47.3
23	07 46 45.49	2.252	21 33 44.9	5.54	14.91	1.43	.790 0383	197.3	13 44.2
24	07 47 39.61	2.257	21 31 31.2	5.60	14.89	1.43	.790 5049	191.5	13 41.2
25	07 48 33.85	2.262	21 29 16.1	5.66	14.87	1.42	.790 9577	185.8	13 38.2
26	07 49 28.20	+2.267	+21 26 59.6	-5.72	14.86	1.42	0.791 3967	+180.1	13 35.1
27	07 50 22.66	2.271	21 24 41.7	5.77	14.84	1.42	.791 8221	174.4	13 32.1
28	07 51 17.23	2.276	21 22 22.4	5.83	14.83	1.42	.792 2337	168.7	13 29.1
29	07 52 11.89	2.280	21 20 01.7	5.89	14.82	1.42	.792 6317	163.0	13 26.1
30	07 53 06.65	2.284	21 17 39.7	5.95	14.80	1.42	.793 0159	157.2	13 23.0
July 1	07 54 01.51	+2.288	+21 15 16.2	-6.01	14.79	1.42	0.793 3864	+151.5	13 20.0
2	07 54 56.45	+2.291	+21 12 51.4	-6.06	14.78	1.41	0.793 7432	+145.8	13 17.0

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Polar S.D.	Hor. Par.	Log of True Dist. from the Earth.	Var. per Hour.	Meri- dian Passage
July	^h ^m ^s	^s	[°] ['] ["]	["]	["]	["]			^h ^m
1	07 54 01.51	+2.288	+21 15 16.2	-6.01	14.79	1.42	0.793 3864	+151.5	13 20.0
2	07 54 56.45	2.291	21 12 51.4	6.06	14.78	1.41	.793 7432	145.8	13 17.0
3	07 55 51.47	2.294	21 10 25.3	6.12	14.77	1.41	.794 0862	140.0	13 14.0
4	07 56 46.56	2.297	21 07 57.8	6.17	14.76	1.41	.794 4154	134.3	13 11.0
5	07 57 41.72	2.300	21 05 28.9	6.23	14.74	1.41	.794 7309	128.6	13 07.9
6	07 58 36.96	+2.303	+21 02 58.7	-6.29	14.73	1.41	0.795 0326	+122.8	13 04.9
7	07 59 32.26	2.305	21 00 27.2	6.34	14.72	1.41	.795 3205	117.1	13 01.9
8	08 00 27.62	2.308	20 57 54.3	6.40	14.72	1.41	.795 5946	111.3	12 58.9
9	08 01 23.03	2.310	20 55 20.2	6.45	14.71	1.41	.795 8547	105.5	12 55.9
10	08 02 18.48	2.311	20 52 44.8	6.50	14.70	1.41	.796 1089	99.7	12 52.9
11	08 03 13.98	+2.313	+20 50 08.1	-6.55	14.69	1.41	0.796 3332	+93.9	12 49.9
12	08 04 09.53	2.315	20 47 30.2	6.61	14.68	1.41	.796 5515	88.0	12 46.8
13	08 05 05.10	2.316	20 44 51.0	6.66	14.68	1.41	.796 7557	82.1	12 43.8
14	08 06 00.70	2.317	20 42 10.6	6.71	14.67	1.40	.796 9458	76.3	12 40.8
15	08 06 56.32	2.318	20 39 28.9	6.76	14.66	1.40	.797 1219	70.4	12 37.8
16	08 07 51.93	+2.318	+20 36 46.0	-6.81	14.66	1.40	0.797 2839	+64.6	12 34.8
17	08 08 47.59	2.319	20 34 01.9	6.86	14.65	1.40	.797 4318	58.7	12 31.8
18	08 09 43.25	2.319	20 31 16.7	6.91	14.65	1.40	.797 5657	52.9	12 28.8
19	08 10 38.89	2.318	20 28 30.4	6.95	14.64	1.40	.797 6855	47.0	12 25.8
20	08 11 34.53	2.318	20 25 42.9	7.00	14.64	1.40	.797 7912	41.1	12 22.8
21	08 12 30.15	+2.317	+20 22 54.3	-7.05	14.64	1.40	0.797 8829	+35.2	12 19.8
22	08 13 25.76	2.317	20 20 04.6	7.09	14.64	1.40	.797 9604	29.4	12 16.8
23	08 14 21.35	2.316	20 17 13.9	7.14	14.63	1.40	.798 0239	23.5	12 13.8
24	08 15 16.92	2.315	20 14 22.1	7.18	14.63	1.40	.798 0733	17.7	12 10.7
25	08 16 12.45	2.313	20 11 29.3	7.22	14.63	1.40	.798 1088	11.9	12 07.7
26	08 17 07.94	+2.311	+20 08 35.4	-7.26	14.63	1.40	0.798 1303	+6.1	12 04.7
27	08 18 03.39	2.309	20 05 40.6	7.30	14.63	1.40	.798 1379	+0.3	12 01.7
28	08 18 58.79	2.307	20 02 44.8	7.35	14.63	1.40	.798 1316	-5.5	11 58.7
29	08 19 54.14	2.305	19 59 48.0	7.38	14.63	1.40	.798 1113	11.3	11 55.7
30	08 20 49.45	2.303	19 56 50.4	7.42	14.63	1.40	.798 0772	17.1	11 52.6
Aug.									
31	08 21 44.69	+2.300	+19 53 51.8	-7.46	14.63	1.40	0.798 0292	-23.0	11 49.6
1	08 22 39.87	2.298	19 50 52.2	7.50	14.64	1.40	.797 9670	28.8	11 46.6
2	08 23 34.99	2.295	19 47 51.8	7.53	14.64	1.40	.797 8909	34.6	11 43.6
3	08 24 30.04	2.292	19 44 50.6	7.57	14.64	1.40	.797 8009	40.4	11 40.6
4	08 25 25.02	2.289	19 41 48.5	7.61	14.64	1.40	.797 6969	46.2	11 37.6
5	08 26 19.92	+2.286	+19 38 45.5	-7.64	14.65	1.40	0.797 5789	-52.1	11 34.5
6	08 27 14.74	2.282	19 35 41.7	7.67	14.65	1.40	.797 4469	57.9	11 31.5
7	08 28 09.47	2.279	19 32 37.2	7.70	14.66	1.40	.797 3010	63.7	11 28.5
8	08 29 04.11	2.275	19 29 32.0	7.73	14.66	1.40	.797 1409	69.6	11 25.5
9	08 29 58.65	2.270	19 26 26.0	7.76	14.67	1.40	.796 9668	75.5	11 22.4
10	08 30 53.08	+2.266	+19 23 19.3	-7.79	14.68	1.41	0.796 7785	-81.4	11 19.4
11	08 31 47.41	2.262	19 20 11.9	7.82	14.68	1.41	.796 5762	87.3	11 16.3
12	08 32 41.64	2.257	19 17 03.9	7.85	14.69	1.41	.796 3597	93.1	11 13.3
13	08 33 35.74	2.252	19 13 55.3	7.87	14.70	1.41	.796 1291	99.0	11 10.3
14	08 34 29.72	2.246	19 10 46.0	7.90	14.71	1.41	.795 8844	104.9	11 07.3
15	08 35 23.57	+2.241	+19 07 36.3	-7.92	14.71	1.41	0.795 6255	-110.8	11 04.2
16	08 36 17.28	2.235	19 04 26.0	7.94	14.72	1.41	0.795 3526	-116.6	11 01.2

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Polar S.D.	Hor. Par.	Log of True Dist. from the Earth.	Var. per Hour.	Meri- dian Passage
	^h ^m ^s	^s	[°] ['] ["]	["]	["]	["]			^h ^m
Aug. 16	08 36 17.28	+2.235	+19 04 26.0	-7.94	14.72	1.41	0.795 3526	-116.6	11 01.2
17	08 37 10.85	2.229	19 01 15.1	7.96	14.73	1.41	.795 0656	122.5	10 58.2
18	08 38 04.27	2.223	18 58 03.8	7.98	14.74	1.41	.794 7645	128.4	10 55.1
19	08 38 57.55	2.217	18 54 52.1	8.00	14.75	1.41	.794 4494	134.2	10 52.1
20	08 39 50.67	2.210	18 51 39.9	8.01	14.77	1.41	.794 1203	140.0	10 49.0
21	08 40 43.63	+2.203	+18 48 27.4	-8.03	14.78	1.41	0.793 7774	-145.8	10 45.9
22	08 41 36.43	2.196	18 45 14.5	8.04	14.79	1.42	.793 4205	151.6	10 42.9
23	08 42 29.05	2.189	18 42 01.4	8.05	14.80	1.42	.793 0498	157.3	10 39.8
24	08 43 21.50	2.182	18 38 47.9	8.07	14.82	1.42	.792 6653	163.1	10 36.8
25	08 44 13.78	2.174	18 35 34.2	8.08	14.83	1.42	.792 2669	168.9	10 33.7
26	08 45 05.87	+2.167	+18 32 20.3	-8.09	14.84	1.42	0.791 8547	-174.6	10 30.6
27	08 45 57.78	2.159	18 29 06.1	8.10	14.86	1.42	.791 4288	180.3	10 27.5
28	08 46 49.49	2.151	18 25 51.7	8.10	14.87	1.42	.790 9892	186.0	10 24.5
29	08 47 41.01	2.143	18 22 37.3	8.10	14.89	1.43	.790 5358	191.8	10 21.4
30	08 48 32.34	2.134	18 19 22.7	8.11	14.90	1.43	.790 0686	197.5	10 18.3
31	08 49 23.46	+2.126	+18 16 08.0	-8.11	14.92	1.43	0.789 5877	-203.2	10 15.2
Sept. 1	08 50 14.37	2.117	18 12 53.2	8.12	14.94	1.43	.789 0931	209.0	10 12.1
2	08 51 05.06	2.108	18 09 38.4	8.12	14.95	1.43	.788 5847	214.7	10 09.0
3	08 51 55.54	2.099	18 06 23.6	8.12	14.97	1.43	.788 0626	220.4	10 05.9
4	08 52 45.80	2.089	18 03 08.8	8.11	14.99	1.44	.787 5268	226.1	10 02.8
5	08 53 35.83	+2.080	+17 59 54.2	-8.11	15.01	1.44	0.786 9772	-231.8	09 59.7
6	08 54 25.63	2.070	17 56 39.6	8.10	15.03	1.44	.786 4140	237.5	09 56.6
7	08 55 15.19	2.060	17 53 25.2	8.10	15.05	1.44	.785 8370	243.2	09 53.5
8	08 56 04.51	2.050	17 50 10.9	8.09	15.07	1.44	.785 2464	248.9	09 50.4
9	08 56 53.57	2.039	17 46 57.0	8.07	15.09	1.44	.784 6421	254.6	09 47.3
10	08 57 42.37	+2.028	+17 43 43.3	-8.06	15.11	1.45	0.784 0241	-260.3	09 44.2
11	08 58 30.92	2.017	17 40 29.8	8.05	15.14	1.45	.783 3925	266.0	09 41.0
12	08 59 19.19	2.006	17 37 16.7	8.04	15.16	1.45	.782 7472	271.7	09 37.9
13	09 00 07.20	1.995	17 34 04.0	8.02	15.18	1.45	.782 0884	277.3	09 34.8
14	09 00 54.93	1.983	17 30 51.9	8.00	15.20	1.46	.781 4162	282.9	09 31.6
15	09 01 42.36	+1.970	+17 27 40.2	-7.98	15.23	1.46	0.780 7305	-288.5	09 28.5
16	09 02 29.51	1.958	17 24 29.0	7.96	15.25	1.46	.780 0315	294.0	09 25.3
17	09 03 16.35	1.945	17 21 18.3	7.93	15.28	1.46	.779 3192	299.5	09 22.1
18	09 04 02.89	1.933	17 18 08.3	7.90	15.30	1.47	.778 5937	305.0	09 19.0
19	09 04 49.13	1.920	17 14 58.9	7.88	15.33	1.47	.777 8551	310.5	09 15.8
20	09 05 35.05	+1.907	+17 11 50.1	-7.85	15.36	1.47	0.777 1034	-315.9	09 12.7
21	09 06 20.65	1.893	17 08 42.1	7.82	15.38	1.47	.776 3387	321.3	09 09.5
22	09 07 05.93	1.880	17 05 34.8	7.79	15.41	1.48	.775 5611	326.7	09 06.3
23	09 07 50.88	1.866	17 02 28.4	7.75	15.44	1.48	.774 7706	332.0	09 03.1
24	09 08 35.50	1.852	16 59 22.8	7.71	15.47	1.48	.773 9673	337.3	08 59.9
25	09 09 19.77	+1.838	+16 56 18.1	-7.68	15.50	1.48	0.773 1513	-342.6	08 56.7
26	09 10 03.71	1.824	16 53 14.3	7.64	15.53	1.49	.772 3226	347.9	08 53.5
27	09 10 47.30	1.809	16 50 11.5	7.60	15.56	1.49	.771 4813	353.2	08 50.3
28	09 11 30.53	1.795	16 47 09.6	7.56	15.59	1.49	.770 6274	358.4	08 47.1
29	09 12 13.40	1.779	16 44 08.8	7.51	15.62	1.50	.769 7609	363.6	08 43.9
30	09 12 55.91	+1.764	+16 41 09.1	-7.47	15.65	1.50	0.768 8820	-368.8	08 40.6
Oct. 1	09 13 38.05	1.748	16 38 10.4	7.42	15.68	1.50	0.767 9907	-374.0	08 37.4

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Polar S.D.	Hor. Par.	Log of True Dist. from the Earth.	Var. per Hour.	Meri- dian Passage
Oct.	^h ^m ^s	^s	[°] ['] ["]	["]	["]	["]			^h ^m
1	09 13 38.05	+1.748	+16 38 10.4	-7.42	15.68	1.50	0.767 9907	-374.0	08 37.4
2	09 14 19.81	1.732	16 35 12.9	7.37	15.71	1.51	.767 0870	379.1	08 34.2
3	09 15 01.19	1.716	16 32 16.6	7.32	15.75	1.51	.766 1710	384.2	08 30.9
4	09 15 42.17	1.700	16 29 21.6	7.26	15.78	1.51	.765 2428	389.3	08 27.7
5	09 16 22.77	1.683	16 26 27.9	7.21	15.81	1.51	.764 3024	394.3	08 24.4
6	09 17 02.97	+1.666	+16 23 35.6	-7.15	15.85	1.52	0.763 3500	-399.4	08 21.1
7	09 17 42.75	1.649	16 20 44.7	7.09	15.88	1.52	.762 3854	404.4	08 17.9
8	09 18 22.11	1.631	16 17 55.3	7.03	15.92	1.52	.761 4090	409.3	08 14.6
9	09 19 01.06	1.614	16 15 07.3	6.97	15.96	1.53	.760 4207	414.2	08 11.3
10	09 19 39.57	1.596	16 12 20.9	6.90	15.99	1.53	.759 4208	419.0	08 08.0
11	09 20 17.65	+1.577	+16 09 36.1	-6.83	16.03	1.53	0.758 4093	-423.8	08 04.7
12	09 20 55.28	1.559	16 06 52.9	6.76	16.07	1.54	.757 3864	428.6	08 01.4
13	09 21 32.46	1.540	16 04 11.5	6.69	16.11	1.54	.756 3521	433.3	07 58.1
14	09 22 09.18	1.520	16 01 31.9	6.61	16.15	1.55	.755 3067	437.9	07 54.7
15	09 22 45.43	1.501	15 58 54.0	6.54	16.19	1.55	.754 2503	442.4	07 51.4
16	09 23 21.22	+1.481	+15 56 18.1	-6.46	16.23	1.55	0.753 1830	-446.9	07 48.1
17	09 23 56.52	1.461	15 53 44.0	6.38	16.27	1.56	.752 1052	451.3	07 44.7
18	09 24 31.34	1.441	15 51 11.9	6.30	16.31	1.56	.751 0168	455.6	07 41.4
19	09 25 05.67	1.420	15 48 41.8	6.21	16.35	1.57	.749 9181	459.9	07 38.0
20	09 25 39.51	1.400	15 46 13.7	6.13	16.39	1.57	.748 8092	464.1	07 34.6
21	09 26 12.85	+1.379	+15 43 47.7	-6.04	16.43	1.57	0.747 6903	-468.3	07 31.2
22	09 26 45.68	1.357	15 41 23.8	5.95	16.47	1.58	.746 5615	472.3	07 27.8
23	09 27 18.00	1.336	15 39 02.2	5.85	16.52	1.58	.745 4231	476.3	07 24.4
24	09 27 49.81	1.314	15 36 42.8	5.76	16.56	1.59	.744 2752	480.2	07 21.0
25	09 28 21.08	1.292	15 34 25.6	5.67	16.61	1.59	.743 1180	484.1	07 17.6
26	09 28 51.83	+1.270	+15 32 10.7	-5.57	16.65	1.59	0.741 9515	-487.9	07 14.2
27	09 29 22.04	1.247	15 29 58.3	5.47	16.70	1.60	.740 7760	491.7	07 10.8
28	09 29 51.70	1.225	15 27 48.2	5.37	16.74	1.60	.739 5915	495.4	07 07.3
29	09 30 20.82	1.202	15 25 40.6	5.27	16.79	1.61	.738 3983	498.9	07 03.8
30	09 30 49.38	1.178	15 23 35.4	5.16	16.83	1.61	.737 1966	502.4	07 00.4
31	09 31 17.38	+1.155	+15 21 32.8	-5.05	16.88	1.62	0.735 9865	-505.9	06 56.9
Nov. 1	09 31 44.80	1.131	15 19 32.8	4.94	16.93	1.62	.734 7683	509.2	06 53.5
2	09 32 11.65	1.107	15 17 35.5	4.83	16.98	1.63	.733 5422	512.5	06 50.0
3	09 32 37.92	1.082	15 15 40.9	4.72	17.02	1.63	.732 3084	515.6	06 46.5
4	09 33 03.59	1.057	15 13 49.0	4.60	17.07	1.63	.731 0672	518.7	06 43.0
5	09 33 28.66	+1.032	+15 11 59.9	-4.49	17.12	1.64	0.729 8186	-521.7	06 39.5
6	09 33 53.13	1.007	15 10 13.7	4.36	17.17	1.64	.728 5630	524.6	06 35.9
7	09 34 16.98	0.981	15 08 30.4	4.24	17.22	1.65	.727 3006	527.4	06 32.4
8	09 34 40.20	0.955	15 06 50.1	4.12	17.27	1.65	.726 0316	530.0	06 28.8
9	09 35 02.80	0.928	15 05 12.7	3.99	17.32	1.66	.724 7565	532.5	06 25.3
10	09 35 24.76	+0.902	+15 03 38.4	-3.86	17.37	1.66	0.723 4755	-534.9	06 21.7
11	09 35 46.08	0.875	15 02 07.2	3.73	17.43	1.67	.722 1890	537.1	06 18.1
12	09 36 06.75	0.848	15 00 39.2	3.60	17.48	1.67	.720 8972	539.3	06 14.5
13	09 36 26.76	0.820	14 59 14.4	3.47	17.53	1.68	.719 6005	541.2	06 10.9
14	09 36 46.11	0.792	14 57 52.8	3.33	17.58	1.68	.718 2993	543.0	06 07.3
15	09 37 04.80	+0.765	+14 56 34.4	-3.20	17.64	1.69	0.716 9939	-544.7	06 03.7
16	09 37 22.81	+0.737	+14 55 19.4	-3.06	17.69	1.69	0.715 6846	-546.3	06 00.0

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Polar S.D.	Hor. Par.	Log of True Dist. from the Earth.	Var. per Hour.	Meri- dian Passage
	^h ^m ^s	^s	[°] ['] ["]	["]	[°] ['] ["]	["]			^h ^m
Nov. 16	09 37 22.81	+0.737	+14 55 19.4	-3.06	17.69	1.69	0.715 6846	-546.3	06 00.0
17	09 37 40.16	0.709	14 54 07.7	2.92	17.74	1.70	.714 3716	547.7	05 56.4
18	09 37 56.82	0.680	14 52 59.3	2.78	17.80	1.70	.713 0555	549.0	05 52.8
19	09 38 12.78	0.651	14 51 54.4	2.63	17.85	1.71	.711 7365	550.1	05 49.1
20	09 38 28.06	0.622	14 50 52.9	2.49	17.90	1.71	.710 4149	551.1	05 45.4
21	09 38 42.64	+0.593	+14 49 54.8	-2.35	17.96	1.72	0.709 0912	-551.9	05 41.7
22	09 38 56.52	0.564	14 49 00.3	2.20	18.01	1.72	.707 7656	552.6	05 38.0
23	09 39 09.70	0.534	14 48 09.3	2.05	18.07	1.73	.706 4385	553.2	05 34.3
24	09 39 22.16	0.504	14 47 21.9	1.90	18.12	1.73	.705 1103	553.6	05 30.6
25	09 39 33.91	0.475	14 46 38.0	1.75	18.18	1.74	.703 7814	553.8	05 26.8
26	09 39 44.95	+0.445	+14 45 57.7	-1.60	18.24	1.75	0.702 4521	-553.9	05 23.1
27	09 39 55.25	0.414	14 45 21.0	1.45	18.29	1.75	.701 1228	553.8	05 19.3
28	09 40 04.83	0.384	14 44 48.1	1.30	18.35	1.76	.699 7939	553.5	05 15.5
29	09 40 13.67	0.353	14 44 18.8	1.14	18.40	1.76	.698 4658	553.1	05 11.7
30	09 40 21.78	0.322	14 43 53.3	0.99	18.46	1.77	.697 1388	552.6	05 07.9
Dec. 1	09 40 29.14	+0.291	+14 43 31.5	-0.83	18.52	1.77	0.695 8133	-551.8	05 04.1
2	09 40 35.75	0.260	14 43 13.5	0.67	18.57	1.78	.694 4900	550.9	05 00.3
3	09 40 41.60	0.228	14 42 59.3	0.51	18.63	1.78	.693 1691	549.7	04 56.5
4	09 40 46.71	0.197	14 42 48.9	0.35	18.69	1.79	.691 8513	548.4	04 52.6
5	09 40 51.06	0.165	14 42 42.4	0.19	18.74	1.79	.690 5369	546.8	04 48.7
6	09 40 54.63	+0.133	+14 42 39.8	-0.03	18.80	1.80	0.689 2265	-545.1	04 44.8
7	09 40 57.44	0.101	14 42 41.0	+0.13	18.86	1.81	.687 9206	543.1	04 41.0
8	09 40 59.49	0.069	14 42 46.1	0.29	18.91	1.81	.686 6197	540.9	04 37.1
9	09 41 00.76	0.037	14 42 55.1	0.46	18.97	1.82	.685 3243	538.5	04 33.2
10	09 41 01.25	+0.004	14 43 08.0	0.62	19.03	1.82	.684 0351	535.8	04 29.3
11	09 41 00.97	-0.028	+14 43 24.8	+0.78	19.08	1.83	0.682 7524	-532.9	04 25.3
12	09 40 59.92	0.060	14 43 45.5	0.94	19.14	1.83	.681 4770	529.8	04 21.4
13	09 40 58.09	0.092	14 44 10.1	1.11	19.19	1.84	.680 2094	526.5	04 17.4
14	09 40 55.50	0.124	14 44 38.6	1.27	19.25	1.84	.678 9500	522.9	04 13.4
15	09 40 52.13	0.156	14 45 11.0	1.43	19.31	1.85	.677 6994	519.1	04 09.4
16	09 40 48.00	-0.188	+14 45 47.2	+1.59	19.36	1.85	0.676 4582	-515.1	04 05.4
17	09 40 43.09	0.220	14 46 27.3	1.75	19.41	1.86	.675 2268	510.9	04 01.4
18	09 40 37.42	0.252	14 47 11.2	1.91	19.47	1.86	.674 0059	506.4	03 57.4
19	09 40 30.99	0.284	14 47 58.8	2.06	19.52	1.87	.672 7961	501.7	03 53.3
20	09 40 23.79	0.316	14 48 50.2	2.22	19.58	1.87	.671 5977	496.8	03 49.3
21	09 40 15.84	-0.347	+14 49 45.3	+2.37	19.63	1.88	0.670 4114	-491.6	03 45.2
22	09 40 07.13	0.378	14 50 44.1	2.53	19.68	1.88	.669 2378	486.3	03 41.1
23	09 39 57.68	0.409	14 51 46.6	2.68	19.73	1.89	.668 0772	480.7	03 37.0
24	09 39 47.48	0.440	14 52 52.8	2.83	19.79	1.89	.666 9304	474.9	03 32.9
25	09 39 36.54	0.471	14 54 02.6	2.98	19.84	1.90	.665 7978	468.9	03 28.8
26	09 39 24.86	-0.502	+14 55 15.9	+3.13	19.89	1.90	0.664 6799	-462.6	03 24.7
27	09 39 12.45	0.532	14 56 32.8	3.28	19.94	1.91	.663 5774	456.1	03 20.6
28	09 38 59.31	0.562	14 57 53.2	3.42	19.99	1.91	.662 4908	449.3	03 16.4
29	09 38 45.45	0.592	14 59 17.1	3.56	20.04	1.92	.661 4206	442.4	03 12.2
30	09 38 30.88	0.622	15 00 44.3	3.70	20.09	1.92	.660 3673	435.2	03 08.1
31	09 38 15.60	-0.652	+15 02 14.9	+3.85	20.14	1.93	0.659 3317	-427.8	03 03.9
32	09 37 59.61	-0.681	+15 03 48.9	+3.99	20.19	1.93	0.658 3143	-420.1	02 59.7

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Polar S.D.	Hor. Par.	Log of True Dist. from the Earth.	Var. per Hour.	Meri- dian Passage	
Jan.	^h ^m ^s	^s	[°] ['] ["]	["] ['] ["]	["] ['] ["]	["] ['] ["]		^h ^m		
1	18 59 24.03	+1.273	-22 23 34.5	+1.63	6.77	0.80	I.0419454	+ 18.6	12 18.9	
2	18 59 54.60	I.274	22 22 55.2	I.65	6.77	0.80	.0419850	14.4	12 15.5	
3	19 00 25.18	I.274	22 22 15.5	I.66	6.77	0.80	.0420144	10.2	12 12.0	
4	19 00 55.77	I.275	22 21 35.4	I.68	6.77	0.80	.0420336	5.8	12 08.6	
5	19 01 26.37	I.275	22 20 54.9	I.70	6.77	0.80	.0420424	+ 1.5	12 05.2	
6	19 01 56.96	+I.274	-22 20 14.0	+I.71	6.77	0.80	I.0420410	- 2.7	12 01.8	
7	19 02 27.54	I.274	22 19 32.8	I.73	6.77	0.80	.0420292	7.0	11 58.3	
8	19 02 58.12	I.274	22 18 51.1	I.74	6.77	0.80	.0420072	11.3	11 54.9	
9	19 03 28.68	I.273	22 18 09.1	I.76	6.77	0.80	.0419749	15.6	11 51.5	
10	19 03 59.22	I.272	22 17 26.7	I.77	6.77	0.80	.0419324	19.9	11 48.1	
11	19 04 29.73	+I.271	-22 16 44.0	+I.79	6.77	0.80	I.0418796	- 24.1	11 44.7	
12	19 05 00.22	I.270	22 16 00.9	I.80	6.77	0.80	.0418165	28.4	11 41.2	
13	19 05 30.67	I.268	22 15 17.4	I.82	6.77	0.80	.0417431	32.7	11 37.8	
14	19 06 01.08	I.266	22 14 33.6	I.83	6.78	0.80	.0416594	37.0	11 34.4	
15	19 06 31.45	I.264	22 13 49.5	I.84	6.78	0.80	.0415654	41.3	11 30.9	
16	19 07 01.76	+I.262	-22 13 05.1	+I.86	6.78	0.80	I.0414610	- 45.6	11 27.5	
17	19 07 32.02	I.260	22 12 20.4	I.87	6.78	0.80	.0413464	49.9	11 24.1	
18	19 08 02.22	I.257	22 11 35.3	I.88	6.78	0.80	.0412215	54.2	11 20.6	
19	19 08 32.34	I.254	22 10 50.0	I.89	6.78	0.80	.0410863	58.5	11 17.2	
20	19 09 02.40	I.251	22 10 04.5	I.90	6.79	0.80	.0409409	62.7	11 13.8	
21	19 09 32.38	+I.248	-22 09 18.7	+I.91	6.79	0.80	I.0407854	- 66.9	11 10.3	
22	19 10 02.28	I.244	22 08 32.6	I.92	6.79	0.80	.0406197	71.2	11 06.9	
23	19 10 32.08	I.240	22 07 46.3	I.93	6.79	0.80	.0404439	75.4	11 03.5	
24	19 11 01.79	I.236	22 06 59.8	I.94	6.80	0.80	.0402579	79.6	11 00.0	
25	19 11 31.40	I.232	22 06 13.1	I.95	6.80	0.80	.0400618	83.8	10 56.6	
26	19 12 00.91	+I.228	-22 05 26.2	+I.96	6.80	0.80	I.0398559	- 87.9	10 53.2	
27	19 12 30.32	I.223	22 04 39.1	I.96	6.81	0.80	.0396400	92.0	10 49.7	
28	19 12 59.61	I.218	22 03 51.9	I.97	6.81	0.80	.0394141	96.2	10 46.3	
29	19 13 28.79	I.213	22 03 04.5	I.98	6.81	0.80	.0391784	100.3	10 42.8	
30	19 13 57.84	I.208	22 02 16.9	I.98	6.82	0.80	.0389329	104.3	10 39.4	
31	19 14 26.76	+I.202	-22 01 29.3	+I.99	6.82	0.80	I.0386777	-108.4	10 35.9	
Feb.	1	19 14 55.55	I.197	22 00 41.5	I.99	6.83	0.80	.0384127	112.4	10 32.4
2	19 15 24.20	I.191	21 59 53.7	2.00	6.83	0.80	.0381381	116.4	10 29.0	
3	19 15 52.72	I.185	21 59 05.7	2.00	6.84	0.81	.0378540	120.4	10 25.6	
4	19 16 21.09	I.179	21 58 17.7	2.00	6.84	0.81	.0375604	124.3	10 22.1	
5	19 16 49.31	+I.173	-21 57 29.6	+2.01	6.84	0.81	I.0372572	-128.3	10 18.6	
6	19 17 17.37	I.166	21 56 41.4	2.01	6.85	0.81	.0369445	132.3	10 15.2	
7	19 17 45.29	I.160	21 55 53.3	2.01	6.85	0.81	.0366223	136.2	10 11.7	
8	19 18 13.04	I.153	21 55 05.0	2.01	6.86	0.81	.0362907	140.1	10 08.2	
9	19 18 40.62	I.146	21 54 16.8	2.01	6.87	0.81	.0359498	144.0	10 04.7	
10	19 19 08.03	+I.139	-21 53 28.5	+2.01	6.87	0.81	I.0355995	-147.9	10 01.3	
11	19 19 35.27	I.131	21 52 40.3	2.01	6.88	0.81	.0352400	151.7	09 57.8	
12	19 20 02.32	I.123	21 51 52.1	2.01	6.88	0.81	.0348713	155.5	09 54.3	
13	19 20 29.19	I.116	21 51 04.0	2.00	6.89	0.81	.0344935	159.3	09 50.8	
14	19 20 55.87	I.108	21 50 16.0	2.00	6.89	0.81	.0341066	163.1	09 47.3	
15	19 21 22.35	+I.099	-21 49 28.0	+2.00	6.90	0.81	I.0337107	-166.8	09 43.8	
16	19 21 48.64	+I.091	-21 48 40.1	+I.99	6.91	0.81	I.0333059	-170.5	09 40.3	

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Polar S.D.	Hor. Par.	Log of True Dist. from the Earth.	Var. per Hour.	Meri- dian Passage
	^h ^m ^s	^s	[°] ['] ["]	["]	["]	["]			^h ^m
Feb. 16	19 21 48.64	+1.091	-21 48 40.1	+1.99	6.91	0.81	1.033 3059	-170.5	09 40.3
17	19 22 14.71	1.082	21 47 52.3	1.99	6.91	0.82	.032 8922	174.2	09 36.8
18	19 22 40.58	1.073	21 47 04.6	1.98	6.92	0.82	.032 4696	177.9	09 33.3
19	19 23 06.23	1.064	21 46 17.1	1.98	6.93	0.82	.032 0384	181.5	09 29.8
20	19 23 31.65	1.055	21 45 29.8	1.97	6.93	0.82	.031 5986	185.0	09 26.3
21	19 23 56.85	+1.045	-21 44 42.7	+1.96	6.94	0.82	1.031 1502	-188.6	09 22.8
22	19 24 21.82	1.036	21 43 55.8	1.95	6.95	0.82	.030 6935	192.0	09 19.2
23	19 24 46.56	1.026	21 43 09.1	1.94	6.96	0.82	.030 2284	195.5	09 15.7
24	19 25 11.06	1.016	21 42 22.6	1.93	6.96	0.82	.029 7552	198.9	09 12.2
25	19 25 35.31	1.005	21 41 36.3	1.92	6.97	0.82	.029 2738	202.3	09 08.7
26	19 25 59.31	+0.995	-21 40 50.4	+1.91	6.98	0.82	1.028 7843	-205.6	09 05.1
27	19 26 23.07	0.985	21 40 04.7	1.90	6.99	0.82	.028 2869	208.9	09 01.6
28	19 26 46.57	0.974	21 39 19.3	1.89	7.00	0.83	.027 7818	212.1	08 58.1
Mar. 1	19 27 09.81	0.963	21 38 34.2	1.87	7.00	0.83	.027 2689	215.3	08 54.5
2	19 27 32.79	0.952	21 37 49.5	1.86	7.01	0.83	.026 7483	218.5	08 50.9
3	19 27 55.50	+0.941	-21 37 05.1	+1.84	7.02	0.83	1.026 2203	-221.6	08 47.4
4	19 28 17.95	0.930	21 36 21.1	1.83	7.03	0.83	.025 6848	224.6	08 43.8
5	19 28 40.12	0.918	21 35 37.4	1.81	7.04	0.83	.025 1420	227.7	08 40.3
6	19 29 02.01	0.906	21 34 54.1	1.80	7.05	0.83	.024 5920	230.6	08 36.7
7	19 29 23.62	0.895	21 34 11.2	1.78	7.06	0.83	.024 0350	233.6	08 33.1
8	19 29 44.95	+0.882	-21 33 28.8	+1.76	7.06	0.83	1.023 4708	-236.5	08 29.5
9	19 30 05.98	0.870	21 32 46.7	1.74	7.07	0.83	.022 8997	239.4	08 25.9
10	19 30 26.73	0.858	21 32 05.2	1.72	7.08	0.83	.022 3218	242.2	08 22.3
11	19 30 47.18	0.846	21 31 24.1	1.70	7.09	0.84	.021 7371	245.0	08 18.7
12	19 31 07.32	0.833	21 30 43.4	1.68	7.10	0.84	.021 1458	247.7	08 15.1
13	19 31 27.16	+0.820	-21 30 03.3	+1.66	7.11	0.84	1.020 5480	-250.4	08 11.5
14	19 31 46.70	0.807	21 29 23.7	1.64	7.12	0.84	.019 9438	253.0	08 07.9
15	19 32 05.92	0.794	21 28 44.6	1.62	7.13	0.84	.019 3334	255.6	08 04.3
16	19 32 24.82	0.781	21 28 06.1	1.59	7.14	0.84	.018 7169	258.1	08 00.7
17	19 32 43.40	0.767	21 27 28.2	1.57	7.15	0.84	.018 0944	260.6	07 57.1
18	19 33 01.64	+0.753	-21 26 50.8	+1.55	7.16	0.84	1.017 4660	-263.0	07 53.5
19	19 33 19.56	0.740	21 26 14.0	1.52	7.17	0.85	.016 8318	265.4	07 49.8
20	19 33 37.14	0.726	21 25 37.9	1.49	7.18	0.85	.016 1922	267.6	07 46.2
21	19 33 54.39	0.712	21 25 02.3	1.47	7.20	0.85	.015 5471	269.9	07 42.6
22	19 34 11.30	0.697	21 24 27.5	1.44	7.21	0.85	.014 8968	272.0	07 38.9
23	19 34 27.86	+0.683	-21 23 53.3	+1.41	7.22	0.85	1.014 2413	-274.2	07 35.2
24	19 34 44.07	0.668	21 23 19.7	1.38	7.23	0.85	.013 5809	276.2	07 31.6
25	19 34 59.93	0.654	21 22 46.9	1.35	7.24	0.85	.012 9158	278.1	07 27.9
26	19 35 15.44	0.639	21 22 14.7	1.32	7.25	0.85	.012 2461	280.0	07 24.2
27	19 35 30.59	0.624	21 21 43.3	1.29	7.26	0.86	.011 5719	281.8	07 20.5
28	19 35 45.39	+0.609	-21 21 12.7	+1.26	7.27	0.86	1.010 8935	-283.5	07 16.8
29	19 35 59.82	0.594	21 20 42.8	1.23	7.28	0.86	.010 2109	285.2	07 13.1
30	19 36 13.89	0.579	21 20 13.6	1.20	7.30	0.86	.009 5243	286.9	07 09.4
31	19 36 27.59	0.563	21 19 45.3	1.16	7.31	0.86	.008 8340	288.4	07 05.7
Apr. 1	19 36 40.92	0.548	21 19 17.7	1.13	7.32	0.86	.008 1399	289.9	07 02.0
2	19 36 53.88	+0.532	-21 18 50.9	+1.10	7.33	0.86	1.007 4424	-291.3	06 58.3
3	19 37 06.47	+0.517	-21 18 24.9	+1.07	7.34	0.87	1.006 7416	-292.7	06 54.6

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Apr. 1	^h 19 ^m 36 ^s 40.92	+0.548	[°] 21 ['] 19 ["] 17.7	+1.13	7.32	0.86	1.008 1399	-289.9	^h 07 ^m 02.0
2	19 36 53.88	0.532	21 18 50.9	1.10	7.33	0.86	0.07 4424	291.3	06 58.3
3	19 37 06.47	0.517	21 18 24.9	1.07	7.34	0.87	0.06 7416	292.7	06 54.6
4	19 37 18.68	0.501	21 17 59.7	1.03	7.35	0.87	0.06 0376	294.0	06 50.9
5	19 37 30.52	0.485	21 17 35.3	1.00	7.37	0.87	0.05 3305	295.2	06 47.1
6	19 37 41.97	+0.469	21 17 11.8	+0.96	7.38	0.87	1.004 6205	-296.4	06 43.4
7	19 37 53.04	0.453	21 16 49.2	0.92	7.39	0.87	0.03 9078	297.5	06 39.6
8	19 38 03.72	0.437	21 16 27.4	0.89	7.40	0.87	0.03 1926	298.5	06 35.8
9	19 38 14.02	0.421	21 16 06.4	0.85	7.42	0.87	0.02 4750	299.5	06 32.1
10	19 38 23.92	0.404	21 15 46.4	0.82	7.43	0.88	0.01 7552	300.3	06 28.3
11	19 38 33.42	+0.388	21 15 27.2	+0.78	7.44	0.88	1.001 0335	-301.1	06 24.6
12	19 38 42.54	0.371	21 15 09.0	0.74	7.45	0.88	1.000 3099	301.8	06 20.8
13	19 38 51.25	0.355	21 14 51.6	0.70	7.46	0.88	0.999 5847	302.5	06 17.0
14	19 38 59.56	0.338	21 14 35.2	0.66	7.48	0.88	0.998 8581	303.0	06 13.2
15	19 39 07.47	0.321	21 14 19.8	0.62	7.49	0.88	0.998 1302	303.5	06 09.4
16	19 39 14.97	+0.304	21 14 05.3	+0.59	7.50	0.88	0.997 4012	-303.9	06 05.6
17	19 39 22.07	0.287	21 13 51.6	0.55	7.51	0.89	0.996 6714	304.2	06 01.8
18	19 39 28.75	0.270	21 13 39.0	0.50	7.53	0.89	0.995 9410	304.4	05 57.9
19	19 39 35.03	0.253	21 13 27.4	0.46	7.54	0.89	0.995 2102	304.5	05 54.1
20	19 39 40.89	0.236	21 13 16.8	0.42	7.55	0.89	0.994 4792	304.5	05 50.3
21	19 39 46.34	+0.219	21 13 07.1	+0.38	7.57	0.89	0.993 7484	-304.5	05 46.4
22	19 39 51.38	0.201	21 12 58.4	0.34	7.58	0.89	0.993 0178	304.3	05 42.6
23	19 39 56.00	0.184	21 12 50.7	0.30	7.59	0.89	0.992 2877	304.1	05 38.7
24	19 40 00.21	0.167	21 12 44.0	0.26	7.60	0.90	0.991 5583	303.7	05 34.9
25	19 40 04.01	0.150	21 12 38.4	0.21	7.62	0.90	0.990 8298	303.3	05 31.0
26	19 40 07.39	+0.132	21 12 33.7	+0.17	7.63	0.90	0.990 1025	-302.8	05 27.1
27	19 40 10.36	0.115	21 12 30.0	0.13	7.64	0.90	0.989 3765	302.2	05 23.2
28	19 40 12.92	0.098	21 12 27.3	0.09	7.65	0.90	0.988 6521	301.5	05 19.3
29	19 40 15.06	0.081	21 12 25.7	0.05	7.67	0.90	0.987 9294	300.7	05 15.4
30	19 40 16.79	0.064	21 12 25.0	+0.01	7.68	0.90	0.987 2087	299.9	05 11.5
May 1	19 40 18.11	+0.046	21 12 25.3	-0.04	7.69	0.91	0.986 4901	-298.9	05 07.6
2	19 40 19.01	0.029	21 12 26.7	0.08	7.71	0.91	0.985 7740	297.8	05 03.7
3	19 40 19.51	+0.012	21 12 29.0	0.12	7.72	0.91	0.985 0605	296.7	04 59.8
4	19 40 19.59	-0.005	21 12 32.4	0.16	7.73	0.91	0.984 3497	295.5	04 55.8
5	19 40 19.25	0.022	21 12 36.7	0.20	7.74	0.91	0.983 6419	294.2	04 51.9
6	19 40 18.51	-0.040	21 12 42.1	-0.24	7.76	0.92	0.982 9373	-292.9	04 48.0
7	19 40 17.35	0.057	21 12 48.4	0.29	7.77	0.92	0.982 2362	291.4	04 44.0
8	19 40 15.78	0.074	21 12 55.8	0.33	7.78	0.92	0.981 5387	289.8	04 40.1
9	19 40 13.80	0.091	21 13 04.2	0.37	7.79	0.92	0.980 8451	288.1	04 36.1
10	19 40 11.41	0.108	21 13 13.6	0.41	7.81	0.92	0.980 1556	286.4	04 32.1
11	19 40 08.61	-0.125	21 13 23.9	-0.45	7.82	0.92	0.979 4703	-284.6	04 28.1
12	19 40 05.41	0.142	21 13 35.3	0.49	7.83	0.92	0.978 7896	282.6	04 24.1
13	19 40 01.80	0.159	21 13 47.6	0.53	7.84	0.92	0.978 1138	280.5	04 20.1
14	19 39 57.78	0.176	21 14 00.9	0.58	7.85	0.93	0.977 4431	278.4	04 16.2
15	19 39 53.36	0.193	21 14 15.2	0.62	7.87	0.93	0.976 7777	276.1	04 12.2
16	19 39 48.54	-0.209	21 14 30.5	-0.66	7.88	0.93	0.976 1178	-273.8	04 08.1
17	19 39 43.32	-0.226	21 14 46.7	-0.70	7.89	0.93	0.975 4637	-271.3	04 04.1

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	^h ^m ^s	^s	[°] ['] ["]	["]	["]	["]			^h ^m
May 17	19 39 43.32	-0.226	-21 14 46.7	-0.70	7.89	0.93	0.975 4637	-271.3	04 04.1
18	19 39 37.70	0.242	21 15 03.9	0.74	7.90	0.93	.974 8156	268.7	04 00.1
19	19 39 31.70	0.258	21 15 22.0	0.78	7.91	0.93	.974 1738	266.1	03 56.1
20	19 39 25.30	0.274	21 15 41.1	0.81	7.93	0.93	.973 5384	263.3	03 52.0
21	19 39 18.52	0.290	21 16 01.1	0.85	7.94	0.94	.972 9098	260.5	03 48.0
22	19 39 11.36	-0.306	-21 16 22.1	-0.89	7.95	0.94	0.972 2882	-257.5	03 43.9
23	19 39 03.81	0.322	21 16 43.9	0.93	7.96	0.94	.971 6738	254.4	03 39.9
24	19 38 55.89	0.338	21 17 06.6	0.96	7.97	0.94	.971 0669	251.3	03 35.8
25	19 38 47.60	0.353	21 17 30.2	1.00	7.98	0.94	.970 4676	248.1	03 31.7
26	19 38 38.94	0.369	21 17 54.6	1.04	7.99	0.94	.969 8762	244.8	03 27.7
27	19 38 29.91	-0.384	-21 18 19.9	-1.07	8.00	0.94	0.969 2928	-241.4	03 23.6
28	19 38 20.53	0.398	21 18 46.1	1.11	8.01	0.95	.968 7177	237.9	03 19.5
29	19 38 10.80	0.413	21 19 13.1	1.14	8.02	0.95	.968 1511	234.3	03 15.4
30	19 38 00.72	0.427	21 19 40.8	1.17	8.03	0.95	.967 5931	230.6	03 11.3
31	19 37 50.30	0.441	21 20 09.4	1.21	8.05	0.95	.967 0441	226.9	03 07.2
June 1	19 37 39.54	-0.455	-21 20 38.8	-1.24	8.06	0.95	0.966 5040	-223.1	03 03.1
2	19 37 28.44	0.469	21 21 08.9	1.27	8.07	0.95	.965 9732	219.2	02 59.0
3	19 37 17.02	0.483	21 21 39.7	1.30	8.07	0.95	.965 4518	215.2	02 54.8
4	19 37 05.26	0.497	21 22 11.3	1.33	8.08	0.95	.964 9400	211.2	02 50.7
5	19 36 53.18	0.510	21 22 43.6	1.36	8.09	0.95	.964 4381	207.0	02 46.6
6	19 36 40.78	-0.523	-21 23 16.6	-1.39	8.10	0.96	0.963 9463	-202.8	02 42.4
7	19 36 28.08	0.536	21 23 50.2	1.41	8.11	0.96	.963 4648	198.4	02 38.3
8	19 36 15.06	0.549	21 24 24.5	1.44	8.12	0.96	.962 9938	194.0	02 34.1
9	19 36 01.75	0.561	21 24 59.5	1.47	8.13	0.96	.962 5335	189.6	02 30.0
10	19 35 48.14	0.573	21 25 35.1	1.50	8.14	0.96	.962 0839	185.0	02 25.8
11	19 35 34.25	-0.585	-21 26 11.3	-1.52	8.15	0.96	0.961 6453	-180.4	02 21.7
12	19 35 20.08	0.596	21 26 48.1	1.55	8.15	0.96	.961 2181	175.6	02 17.5
13	19 35 05.63	0.608	21 27 25.5	1.57	8.16	0.96	.960 8022	170.9	02 13.3
14	19 34 50.91	0.619	21 28 03.4	1.59	8.17	0.96	.960 3978	166.0	02 09.2
15	19 34 35.93	0.629	21 28 41.9	1.61	8.18	0.96	.960 0053	161.0	02 05.0
16	19 34 20.71	-0.640	-21 29 20.8	-1.63	8.18	0.96	0.959 6249	-156.0	02 00.8
17	19 34 05.23	0.650	21 30 00.3	1.65	8.19	0.96	.959 2566	150.9	01 56.6
18	19 33 49.51	0.660	21 30 40.2	1.67	8.20	0.97	.958 9007	145.7	01 52.4
19	19 33 33.57	0.669	21 31 20.6	1.69	8.20	0.97	.958 5573	140.5	01 48.2
20	19 33 17.41	0.678	21 32 01.4	1.71	8.21	0.97	.958 2265	135.2	01 44.0
21	19 33 01.04	-0.686	-21 32 42.7	-1.73	8.22	0.97	0.957 9084	-129.9	01 39.8
22	19 32 44.46	0.695	21 33 24.2	1.74	8.22	0.97	.957 6032	124.5	01 35.6
23	19 32 27.69	0.703	21 34 06.1	1.75	8.23	0.97	.957 3110	119.0	01 31.4
24	19 32 10.73	0.710	21 34 48.4	1.77	8.23	0.97	.957 0319	113.5	01 27.2
25	19 31 53.59	0.718	21 35 30.9	1.78	8.24	0.97	.956 7660	108.0	01 23.0
26	19 31 36.28	-0.725	-21 36 13.8	-1.79	8.24	0.97	0.956 5135	-102.4	01 18.7
27	19 31 18.81	0.731	21 36 56.9	1.80	8.25	0.97	.956 2744	96.8	01 14.5
28	19 31 01.19	0.737	21 37 40.2	1.81	8.25	0.97	.956 0487	91.2	01 10.3
29	19 30 43.42	0.743	21 38 23.8	1.82	8.26	0.97	.955 8367	85.5	01 06.1
30	19 30 25.52	0.749	21 39 07.5	1.83	8.26	0.97	.955 6383	79.8	01 01.8
July 1	19 30 07.49	-0.754	-21 39 51.4	-1.83	8.26	0.97	0.955 4536	-74.1	00 57.6
2	19 29 49.34	-0.759	-21 40 35.4	-1.84	8.27	0.97	0.955 2827	-68.3	00 53.4

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Polar S.D.	Hor. Par.	Log of True Dist. from the Earth.	Var. per Hour.	Meri- dian Passage
July	^{h m s} 1 19 30 07.49	^s -0.754	^{° ' "} -21 39 51.4	["] -1.83	["] 8.26	["] 0.97	0.955 4536	- 74.1	^{h m} 00 57.6
	2 19 29 49.34	0.759	21 40 35.4	1.84	8.27	0.97	.955 2827	68.3	00 53.4
	3 19 29 31.08	0.763	21 41 19.6	1.84	8.27	0.97	.955 1258	62.5	00 49.2
	4 19 29 12.72	0.767	21 42 03.8	1.85	8.27	0.98	.954 9828	56.6	00 44.9
	5 19 28 54.26	0.771	21 42 48.2	1.85	8.27	0.98	.954 8539	50.8	00 40.7
	6 19 28 35.72	-0.774	-21 43 32.6	-1.85	8.28	0.98	0.954 7391	- 44.9	00 36.4
	7 19 28 17.10	0.777	21 44 17.1	1.85	8.28	0.98	.954 6385	39.0	00 32.2
	8 19 27 58.42	0.780	21 45 01.6	1.85	8.28	0.98	.954 5521	33.0	00 28.0
	9 19 27 39.68	0.782	21 45 46.1	1.85	8.28	0.98	.954 4800	27.1	00 23.7
	10 19 27 20.89	0.784	21 46 30.7	1.85	8.28	0.98	.954 4222	21.1	00 19.5
	11 19 27 02.06	-0.785	-21 47 15.1	-1.85	8.28	0.98	0.954 3789	- 15.1	00 15.2
	12 19 26 43.21	0.786	21 47 59.5	1.85	8.28	0.98	.954 3499	9.1	00 11.0
	13 19 26 24.34	0.786	21 48 43.8	1.84	8.28	0.98	.954 3353	- 3.0	00 06.7
	14 19 26 05.46	0.787	21 49 28.0	1.84	8.28	0.98	.954 3353	+ 3.0	{ 00 02.5 23 58.2 }
	15 19 25 46.58	0.787	21 50 12.0	1.83	8.28	0.98	.954 3497	9.0	23 54.0
	16 19 25 27.71	-0.786	-21 50 55.9	-1.83	8.28	0.98	0.954 3786	+ 15.1	23 49.8
	17 19 25 08.87	0.784	21 51 39.7	1.82	8.28	0.98	.954 4220	21.1	23 45.5
	18 19 24 50.06	0.783	21 52 23.3	1.81	8.28	0.98	.954 4798	27.1	23 41.3
	19 19 24 31.29	0.781	21 53 06.7	1.80	8.28	0.98	.954 5521	33.1	23 37.0
	20 19 24 12.57	0.779	21 53 49.8	1.79	8.28	0.98	.954 6387	39.0	23 32.8
	21 19 23 53.92	-0.776	-21 54 32.7	-1.78	8.28	0.98	0.954 7395	+ 45.0	23 28.5
	22 19 23 35.34	0.773	21 55 15.3	1.77	8.27	0.98	.954 8546	50.9	23 24.3
	23 19 23 16.84	0.769	21 55 57.6	1.76	8.27	0.98	.954 9839	56.8	23 20.1
	24 19 22 58.43	0.765	21 56 39.7	1.75	8.27	0.97	.955 1272	62.6	23 15.8
	25 19 22 40.13	0.760	21 57 21.4	1.73	8.27	0.97	.955 2846	68.5	23 11.6
	26 19 22 21.94	-0.756	-21 58 02.7	-1.71	8.26	0.97	0.955 4559	+ 74.2	23 07.4
	27 19 22 03.85	0.751	21 58 43.8	1.70	8.26	0.97	.955 6409	80.0	23 03.1
	28 19 21 45.90	0.745	21 59 24.5	1.69	8.26	0.97	.955 8397	85.7	22 58.9
	29 19 21 28.09	0.739	22 00 04.8	1.67	8.25	0.97	.956 0521	91.4	22 54.7
	30 19 21 10.41	0.733	22 00 44.6	1.65	8.25	0.97	.956 2782	97.0	22 50.5
	31 19 20 52.88	-0.727	-22 01 24.1	-1.64	8.24	0.97	0.956 5177	+ 102.6	22 46.2
Aug.	1 19 20 35.52	0.720	22 02 03.1	1.62	8.24	0.97	.956 7706	108.2	22 42.0
	2 19 20 18.33	0.713	22 02 41.7	1.60	8.23	0.97	.957 0369	113.7	22 37.8
	3 19 20 01.32	0.705	22 03 19.8	1.58	8.23	0.97	.957 3162	119.1	22 33.6
	4 19 19 44.49	0.697	22 03 57.5	1.56	8.22	0.97	.957 6086	124.5	22 29.4
	5 19 19 27.85	-0.689	-22 04 34.7	-1.54	8.22	0.97	0.957 9140	+ 129.9	22 25.2
	6 19 19 11.42	0.680	22 05 11.4	1.52	8.21	0.97	.958 2321	135.2	22 21.0
	7 19 18 55.19	0.671	22 05 47.6	1.50	8.20	0.97	.958 5630	140.5	22 16.8
	8 19 18 39.19	0.662	22 06 23.3	1.48	8.20	0.97	.958 9065	145.7	22 12.6
	9 19 18 23.41	0.652	22 06 58.4	1.46	8.19	0.96	.959 2624	150.9	22 08.4
	10 19 18 07.87	-0.642	-22 07 33.1	-1.43	8.18	0.96	0.959 6307	+ 156.0	22 04.2
	11 19 17 52.58	0.632	22 08 07.2	1.41	8.18	0.96	.960 0111	161.0	22 00.1
	12 19 17 37.54	0.621	22 08 40.7	1.39	8.17	0.96	.960 4036	166.0	21 55.9
	13 19 17 22.75	0.610	22 09 13.7	1.36	8.16	0.96	.960 8079	170.9	21 51.7
	14 19 17 08.24	0.599	22 09 46.1	1.34	8.15	0.96	.961 2239	175.7	21 47.5
	15 19 16 54.00	-0.588	-22 10 17.9	-1.31	8.15	0.96	0.961 6514	+ 180.5	21 43.4
	16 19 16 40.04	-0.576	-22 10 49.1	-1.29	8.14	0.96	0.962 0902	+ 185.1	21 39.2

SATURN, 1931.

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Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Polar S.D.	Hor. Par.	Log of True Dist. from the Earth.	Var. per Hour.	Meri- dian Passage
	^h ^m ^s	^s	[°] ['] ["]	["]	[°] ['] ["]	["]			^h ^m
Aug. 16	19 16 40.04	-0.576	-22 10 49.1	-1.29	8.14	0.96	0.962 0902	+185.1	21 39.2
17	19 16 26.37	-0.563	22 11 19.7	1.26	8.13	0.96	0.962 5400	189.7	21 35.1
18	19 16 13.00	-0.551	22 11 49.7	1.24	8.12	0.96	0.963 0008	194.2	21 30.9
19	19 15 59.94	-0.538	22 12 19.0	1.21	8.11	0.96	0.963 4722	198.6	21 26.8
20	19 15 47.18	-0.525	22 12 47.8	1.18	8.10	0.96	0.963 9542	202.9	21 22.6
21	19 15 34.75	-0.511	-22 13 15.8	-1.15	8.09	0.95	0.964 4463	+207.2	21 18.5
22	19 15 22.64	-0.498	-22 13 43.2	-1.13	8.08	0.95	0.964 9486	211.3	21 14.3
23	19 15 10.86	-0.484	-22 14 10.0	-1.10	8.07	0.95	0.965 4606	215.4	21 10.2
24	19 14 59.40	-0.470	-22 14 36.2	-1.08	8.06	0.95	0.965 9823	219.3	21 06.1
25	19 14 48.29	-0.456	-22 15 01.6	-1.05	8.05	0.95	0.966 5134	223.2	21 02.0
26	19 14 37.52	-0.442	-22 15 26.4	-1.02	8.04	0.95	0.967 0537	+227.0	20 57.9
27	19 14 27.09	-0.427	-22 15 50.5	-0.99	8.03	0.95	0.967 6030	230.7	20 53.8
28	19 14 17.02	-0.412	-22 16 13.9	-0.96	8.02	0.95	0.968 1611	234.3	20 49.7
29	19 14 07.30	-0.397	-22 16 36.7	-0.93	8.01	0.95	0.968 7278	237.9	20 45.6
30	19 13 57.94	-0.382	-22 16 58.7	-0.90	8.00	0.94	0.969 3030	241.4	20 41.5
31	19 13 48.95	+0.367	-22 17 20.1	-0.88	7.99	0.94	0.969 8864	+244.7	20 37.4
Sept. 1	19 13 40.33	-0.351	-22 17 40.7	-0.85	7.98	0.94	0.970 4776	247.9	20 33.4
2	19 13 32.08	-0.336	-22 18 00.7	-0.82	7.97	0.94	0.971 0767	251.2	20 29.3
3	19 13 24.21	-0.320	-22 18 19.9	-0.79	7.96	0.94	0.971 6832	254.3	20 25.3
4	19 13 16.73	-0.304	-22 18 38.5	-0.76	7.95	0.94	0.972 2972	257.3	20 21.2
5	19 13 09.63	-0.288	-22 18 56.4	-0.73	7.94	0.94	0.972 9182	+260.2	20 17.2
6	19 13 02.92	-0.271	-22 19 13.6	-0.70	7.93	0.93	0.973 5462	263.0	20 13.1
7	19 12 56.60	-0.255	-22 19 30.0	-0.67	7.91	0.93	0.974 1808	265.8	20 09.1
8	19 12 50.68	-0.238	-22 19 45.8	-0.64	7.90	0.93	0.974 8220	268.5	20 05.1
9	19 12 45.16	-0.222	-22 20 00.8	-0.61	7.89	0.93	0.975 4694	271.0	20 01.1
10	19 12 40.04	-0.205	-22 20 15.1	-0.58	7.88	0.93	0.976 1228	+273.5	19 57.1
11	19 12 35.33	-0.188	-22 20 28.7	-0.55	7.87	0.93	0.976 7820	275.8	19 53.1
12	19 12 31.03	-0.170	-22 20 41.5	-0.52	7.85	0.93	0.977 4467	278.1	19 49.1
13	19 12 27.15	-0.153	-22 20 53.6	-0.49	7.84	0.92	0.978 1167	280.2	19 45.1
14	19 12 23.68	-0.136	-22 21 05.0	-0.46	7.83	0.92	0.978 7917	282.2	19 41.1
15	19 12 20.63	-0.118	-22 21 15.6	-0.43	7.82	0.92	0.979 4715	+284.2	19 37.1
16	19 12 18.00	-0.101	-22 21 25.5	-0.40	7.81	0.92	0.980 1558	286.0	19 33.1
17	19 12 15.79	-0.083	-22 21 34.7	-0.37	7.79	0.92	0.980 8444	287.8	19 29.2
18	19 12 14.00	-0.066	-22 21 43.1	-0.34	7.78	0.92	0.981 5371	289.4	19 25.2
19	19 12 12.63	-0.048	-22 21 50.8	-0.30	7.77	0.92	0.982 2335	290.9	19 21.3
20	19 12 11.68	-0.031	-22 21 57.6	-0.27	7.76	0.92	0.982 9335	+292.4	19 17.3
21	19 12 11.16	-0.013	-22 22 03.7	-0.24	7.74	0.91	0.983 6369	293.7	19 13.4
22	19 12 11.07	+0.005	-22 22 09.1	-0.21	7.73	0.91	0.984 3433	294.9	19 09.5
23	19 12 11.40	-0.023	-22 22 13.7	-0.18	7.72	0.91	0.985 0526	296.1	19 05.5
24	19 12 12.15	-0.040	-22 22 17.6	-0.15	7.71	0.91	0.985 7645	297.1	19 01.6
25	19 12 13.32	+0.058	-22 22 20.8	-0.12	7.69	0.91	0.986 4789	+298.1	18 57.7
26	19 12 14.92	-0.076	-22 22 23.2	-0.08	7.68	0.90	0.987 1955	299.0	18 53.8
27	19 12 16.95	-0.093	-22 22 24.8	-0.05	7.67	0.90	0.987 9140	299.8	18 49.9
28	19 12 19.40	-0.111	-22 22 25.7	-0.02	7.66	0.90	0.988 6344	300.5	18 46.0
29	19 12 22.27	-0.129	-22 22 25.9	+0.01	7.64	0.90	0.989 3563	301.1	18 42.2
30	19 12 25.57	+0.146	-22 22 25.3	+0.04	7.63	0.90	0.990 0796	+301.6	18 38.3
Oct. 1	19 12 29.29	+0.164	-22 22 23.9	+0.07	7.62	0.90	0.990 8041	+302.1	18 34.4

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Polar S.D.	Hor. Par.	Log of True Dist. from the Earth.	Var. per Hour.	Meri- dian Passage
Oct. 1	^{h m s} 19 12 29.29	^s +0.164	^{° ′ ″} -22 22 23.9	[″] +0.07	[″] 7.62	[″] 0.90	0.990 8041	^{h m} +302.1 18 34.4	
2	19 12 33.43	0.181	22 22 21.8	0.10	7.60	0.90	.991 5295	302.4 18 30.6	
3	19 12 38.00	0.199	22 22 18.9	0.13	7.59	0.89	.992 2558	302.7 18 26.7	
4	19 12 42.99	0.217	22 22 15.3	0.17	7.58	0.89	.992 9826	302.9 18 22.9	
5	19 12 48.40	0.234	22 22 10.9	0.20	7.57	0.89	.993 7098	303.0 18 19.0	
6	19 12 54.23	+0.252	-22 22 05.7	+0.23	7.55	0.89	0.994 4372	+303.0 18 15.2	
7	19 13 00.48	0.269	22 21 59.8	0.26	7.54	0.89	.995 1644	303.0 18 11.4	
8	19 13 07.15	0.287	22 21 53.2	0.29	7.53	0.89	.995 8915	302.8 18 07.6	
9	19 13 14.24	0.304	22 21 45.8	0.33	7.52	0.89	.996 6180	302.6 18 03.8	
10	19 13 21.74	0.321	22 21 37.6	0.36	7.50	0.88	.997 3438	302.2 18 00.0	
11	19 13 29.66	+0.339	-22 21 28.6	+0.39	7.49	0.88	0.998 0687	+301.8 17 56.2	
12	19 13 38.00	0.356	22 21 18.9	0.42	7.48	0.88	.998 7925	301.3 17 52.4	
13	19 13 46.75	0.373	22 21 08.4	0.45	7.47	0.88	0.999 5149	300.7 17 48.6	
14	19 13 55.91	0.390	22 20 57.2	0.49	7.45	0.88	1.000 2357	299.9 17 44.8	
15	19 14 05.47	0.407	22 20 45.1	0.52	7.44	0.88	.000 9546	299.2 17 41.0	
16	19 14 15.45	+0.424	-22 20 32.3	+0.55	7.43	0.88	1.001 6717	+298.3 17 37.3	
17	19 14 25.83	0.441	22 20 18.7	0.58	7.42	0.87	.002 3866	297.4 17 33.5	
18	19 14 36.61	0.457	22 20 04.3	0.61	7.40	0.87	.003 0991	296.3 17 29.8	
19	19 14 47.78	0.474	22 19 49.2	0.65	7.39	0.87	.003 8090	295.2 17 26.1	
20	19 14 59.34	0.490	22 19 33.3	0.68	7.38	0.87	.004 5163	294.1 17 22.3	
21	19 15 11.30	+0.506	-22 19 16.6	+0.71	7.37	0.87	1.005 2205	+292.8 17 18.6	
22	19 15 23.65	0.522	22 18 59.1	0.74	7.36	0.87	.005 9217	291.5 17 14.9	
23	19 15 36.38	0.538	22 18 40.9	0.78	7.34	0.87	.006 6196	290.1 17 11.1	
24	19 15 49.49	0.554	22 18 21.9	0.81	7.33	0.86	.007 3141	288.6 17 07.4	
25	19 16 02.98	0.570	22 18 02.1	0.84	7.32	0.86	.008 0050	287.1 17 03.7	
26	19 16 16.85	+0.585	-22 17 41.6	+0.87	7.31	0.86	1.008 6921	+285.5 17 00.0	
27	19 16 31.08	0.601	22 17 20.3	0.90	7.30	0.86	.009 3754	283.9 16 56.3	
28	19 16 45.69	0.616	22 16 58.2	0.94	7.29	0.86	.010 0546	282.1 16 52.7	
29	19 17 00.66	0.631	22 16 35.4	0.97	7.27	0.86	.010 7297	280.4 16 49.0	
30	19 17 15.99	0.646	22 16 11.8	1.00	7.26	0.86	.011 4004	278.5 16 45.3	
31	19 17 31.68	+0.661	-22 15 47.4	+1.03	7.25	0.85	1.012 0666	+276.6 16 41.6	
Nov. 1	19 17 47.73	0.676	22 15 22.2	1.06	7.24	0.85	.012 7282	274.6 16 38.0	
2	19 18 04.13	0.691	22 14 56.3	1.10	7.23	0.85	.013 3849	272.6 16 34.3	
3	19 18 20.88	0.705	22 14 29.6	1.13	7.22	0.85	.014 0367	270.5 16 30.7	
4	19 18 37.97	0.719	22 14 02.2	1.16	7.21	0.85	.014 6834	268.4 16 27.0	
5	19 18 55.41	+0.734	-22 13 34.0	+1.19	7.20	0.85	1.015 3249	+266.2 16 23.4	
6	19 19 13.19	0.748	22 13 05.0	1.22	7.19	0.85	.015 9610	263.9 16 19.7	
7	19 19 31.31	0.762	22 12 35.2	1.26	7.18	0.85	.016 5916	261.5 16 16.1	
8	19 19 49.77	0.776	22 12 04.6	1.29	7.17	0.84	.017 2164	259.1 16 12.5	
9	19 20 08.55	0.789	22 11 33.2	1.32	7.16	0.84	.017 8353	256.6 16 08.9	
10	19 20 27.66	+0.803	-22 11 01.1	+1.35	7.15	0.84	1.018 4482	+254.1 16 05.3	
11	19 20 47.10	0.816	22 10 28.2	1.39	7.14	0.84	.019 0549	251.5 16 01.7	
12	19 21 06.84	0.829	22 09 54.6	1.42	7.13	0.84	.019 6553	248.8 15 58.1	
13	19 21 26.90	0.842	22 09 20.2	1.45	7.12	0.84	.020 2493	246.1 15 54.5	
14	19 21 47.26	0.855	22 08 45.0	1.48	7.11	0.84	.020 8366	243.3 15 50.9	
15	19 22 07.93	+0.867	-22 08 09.0	+1.52	7.10	0.84	1.021 4173	+240.5 15 47.3	
16	19 22 28.89	+0.879	-22 07 32.2	+1.55	7.09	0.84	1.021 9910	+237.6 15 43.7	

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Polar S.D.	Hor. Par.	Log of True Dist. from the Earth.	Var. per Hour.	Meri- dian Passage
Nov. 16	^{h m s} 19 22 28.89	^s +0.879	^{° ′ ″} -22 07 32.2	[″] +1.55	^{° ′ ″} 7.09	[″] 0.84	1.021 9910	^s +237.6	^{h m} 15 43.7
17	19 22 50.14	0.892	22 06 54.6	1.58	7.08	0.83	.022 5578	234.6	15 40.1
18	19 23 11.69	0.904	22 06 16.4	1.61	7.07	0.83	.023 1175	231.7	15 36.6
19	19 23 33.52	0.915	22 05 37.4	1.64	7.06	0.83	.023 6701	228.7	15 33.0
20	19 23 55.63	0.927	22 04 57.6	1.67	7.05	0.83	.024 2154	225.7	15 29.4
21	19 24 18.01	+0.938	-22 04 17.0	+1.71	7.04	0.83	1.024 7533	+222.6	15 25.9
22	19 24 40.66	0.949	22 03 35.7	1.74	7.04	0.83	.025 2838	219.5	15 22.3
23	19 25 03.57	0.960	22 02 53.7	1.77	7.03	0.83	.025 8067	216.3	15 18.8
24	19 25 26.75	0.971	22 02 10.9	1.80	7.02	0.83	.026 3220	213.1	15 15.2
25	19 25 50.18	0.981	22 01 27.4	1.83	7.01	0.83	.026 8296	209.8	15 11.7
26	19 26 13.86	+0.992	-22 00 43.2	+1.86	7.00	0.83	1.027 3292	+206.5	15 08.1
27	19 26 37.78	1.002	21 59 58.2	1.89	6.99	0.83	.027 8210	203.2	15 04.6
28	19 27 01.95	1.012	21 59 12.5	1.92	6.99	0.82	.028 3047	199.9	15 01.1
29	19 27 26.37	1.022	21 58 26.1	1.95	6.98	0.82	.028 7803	196.5	14 57.6
30	19 27 51.01	1.032	21 57 38.9	1.98	6.97	0.82	.029 2477	193.0	14 54.0
Dec. 1	19 28 15.89	+1.041	-21 56 50.9	+2.01	6.96	0.82	1.029 7068	+189.6	14 50.5
2	19 28 40.99	1.051	21 56 02.3	2.04	6.96	0.82	.030 1577	186.1	14 47.0
3	19 29 06.32	1.060	21 55 12.9	2.07	6.95	0.82	.030 6000	182.5	14 43.5
4	19 29 31.86	1.069	21 54 22.9	2.10	6.94	0.82	.031 0337	178.9	14 40.0
5	19 29 57.61	1.077	21 53 32.1	2.13	6.94	0.82	.031 4589	175.3	14 36.5
6	19 30 23.57	+1.086	-21 52 40.6	+2.16	6.93	0.82	1.031 8753	+171.7	14 33.0
7	19 30 49.73	1.094	21 51 48.4	2.19	6.92	0.82	.032 2829	168.0	14 29.5
8	19 31 16.10	1.102	21 50 55.5	2.22	6.92	0.82	.032 6815	164.2	14 26.0
9	19 31 42.65	1.110	21 50 01.9	2.25	6.91	0.81	.033 0711	160.4	14 22.5
10	19 32 09.40	1.118	21 49 07.5	2.28	6.90	0.81	.033 4516	156.6	14 19.0
11	19 32 36.32	+1.125	-21 48 12.5	+2.30	6.90	0.81	1.033 8229	+152.8	14 15.5
12	19 33 03.42	1.133	21 47 16.9	2.33	6.89	0.81	.034 1850	148.9	14 12.1
13	19 33 30.70	1.140	21 46 20.5	2.36	6.89	0.81	.034 5378	145.0	14 08.6
14	19 33 58.14	1.147	21 45 23.5	2.39	6.88	0.81	.034 8812	141.1	14 05.1
15	19 34 25.74	1.153	21 44 25.8	2.42	6.88	0.81	.035 2152	137.2	14 01.7
16	19 34 53.50	+1.160	-21 43 27.5	+2.44	6.87	0.81	1.035 5396	+133.2	13 58.2
17	19 35 21.40	1.166	21 42 28.5	2.47	6.87	0.81	.035 8546	129.2	13 54.7
18	19 35 49.45	1.172	21 41 28.9	2.50	6.86	0.81	.036 1600	125.2	13 51.2
19	19 36 17.64	1.178	21 40 28.6	2.52	6.86	0.81	.036 4557	121.2	13 47.8
20	19 36 45.97	1.183	21 39 27.8	2.55	6.85	0.81	.036 7418	117.2	13 44.3
21	19 37 14.42	+1.188	-21 38 26.3	+2.57	6.85	0.81	1.037 0182	+113.1	13 40.9
22	19 37 43.00	1.193	21 37 24.2	2.60	6.84	0.81	.037 2848	109.1	13 37.4
23	19 38 11.71	1.198	21 36 21.5	2.62	6.84	0.81	.037 5417	105.0	13 33.9
24	19 38 40.52	1.203	21 35 18.2	2.65	6.84	0.81	.037 7889	100.9	13 30.5
25	19 39 09.45	1.208	21 34 14.3	2.67	6.83	0.80	.038 0262	96.8	13 27.0
26	19 39 38.48	+1.212	-21 33 09.8	+2.70	6.83	0.80	1.038 2537	+92.7	13 23.6
27	19 40 07.61	1.216	21 32 04.8	2.72	6.83	0.80	.038 4712	88.6	13 20.1
28	19 40 36.84	1.220	21 30 59.3	2.74	6.82	0.80	.038 6788	84.4	13 16.7
29	19 41 06.16	1.224	21 29 53.2	2.77	6.82	0.80	.038 8765	80.3	13 13.3
30	19 41 35.58	1.228	21 28 46.5	2.79	6.82	0.80	.039 0642	76.1	13 09.8
31	19 42 05.08	+1.231	-21 27 39.3	+2.81	6.81	0.80	1.039 2418	+71.9	13 06.4
32	19 42 34.65	+1.234	-21 26 31.6	+2.83	6.81	0.80	1.039 4093	+67.7	13 02.9

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Jan. — 1	^{h m s} 00 43 14.36	^s + 1.582	^{° ' "} +3 55 29.9	["] +12.61	["] 1.72	["] 0.44	1.299 2490	^{h m} +3746 18 09.4	
3	00 43 22.21	2.343	3 56 30.0	17.44	1.72	0.44	300 7469	3741 17 53.8	
7	00 43 33.09	3.095	3 57 49.3	22.19	1.71	0.44	302 2396	3719 17 38.3	
11	00 43 46.96	3.838	3 59 27.4	26.86	1.70	0.44	303 7198	3679 17 22.8	
15	00 44 03.78	4.571	4 01 24.1	31.47	1.70	0.44	305 1809	3623 17 07.4	
19	00 44 23.51	+ 5.289	+4 03.39.0	+35.96	1.69	0.43	1.306 6161	+3549 16 52.0	
23	00 44 46.06	5.982	4 06 11.6	40.29	1.69	0.43	308 0181	3458 16 36.6	
27	00 45 11.33	6.650	4 09 01.1	44.46	1.68	0.43	309 3808	3353 16 21.3	
31	00 45 39.22	7.289	4 12 07.0	48.40	1.68	0.43	310 6983	3233 16 06.1	
Feb. 4	00 46 09.60	7.897	4 15 28.0	52.10	1.67	0.43	311 9653	3101 15 50.9	
8	00 46 42.36	+ 8.479	+4 19 03.6	+55.68	1.67	0.43	1.313 1772	+2956 15 35.7	
12	00 47 17.39	9.030	4 22 53.2	59.06	1.66	0.43	314.3288	2800 15 20.5	
16	00 47 54.56	9.550	4 26 55.8	62.21	1.66	0.43	315 4155	2633 15 05.4	
20	00 48 33.74	10.034	4 31 10.5	65.08	1.65	0.42	316 4338	2455 14 50.4	
24	00 49 14.78	10.477	4 35 36.1	67.71	1.65	0.42	317 3780	2266 14 35.3	
28	00 49 57.50	+10.876	+4 40 11.8	+70.05	1.65	0.42	1.318 2458	+2071 14 20.3	
Mar. 4	00 50 41.74	11.238	4 44 56.2	72.15	1.64	0.42	319 0343	1870 14 05.3	
8	00 51 27.36	11.567	4 49 48.7	74.03	1.64	0.42	319 7414	1664 13 50.3	
12	00 52 14.22	11.856	4 54 48.1	75.64	1.64	0.42	320 3644	1451 13 35.4	
16	00 53 02.15	12.103	4 59 53.5	77.00	1.64	0.42	320 9015	1233 13 20.5	
20	00 53 50.99	+12.310	+5 05 03.7	+78.07	1.64	0.42	1.321 3502	+1011 13 05.6	
24	00 54 40.57	12.472	5 10 17.7	78.89	1.63	0.42	321 7096	786 12 50.7	
28	00 55 30.71	12.590	5 15 34.4	79.39	1.63	0.42	321 9784	558 12 35.8	
Apr. 1	00 56 21.24	12.669	5 20 52.5	79.64	1.63	0.42	322 1562	331 12 20.9	
5	00 57 12.01	12.709	5 26 11.2	79.67	1.63	0.42	322 2436	+ 105 12 06.0	
9	00 58 02.86	+12.709	+5 31 29.5	+79.45	1.63	0.42	1.322 2402	— 122 11 51.1	
13	00 58 53.63	12.670	5 36 46.5	79.00	1.63	0.42	322 1462	349 11 36.2	
17	00 59 44.17	12.590	5 42 01.1	78.26	1.63	0.42	321 9615	574 11 21.3	
21	01 00 34.29	12.463	5 47 12.2	77.26	1.63	0.42	321 6871	797 11 06.4	
25	01 01 23.82	12.296	5 52 18.8	75.99	1.64	0.42	321 3243	1016 10 51.5	
29	01 02 12.61	+12.095	+5 57 19.8	+74.48	1.64	0.42	1.320 8750	— 1230 10 36.6	
May 3	01 03 00.53	11.857	6 02 14.4	72.79	1.64	0.42	320 3413	1438 10 21.7	
7	01 03 47.41	11.576	6 07 01.9	70.93	1.64	0.42	319 7252	1642 10 06.7	
11	01 04 33.10	11.269	6 11 41.5	68.80	1.64	0.42	319 0283	1841 09 51.7	
15	01 05 17.51	10.923	6 16 12.0	66.43	1.65	0.42	318 2533	2034 09 36.7	
19	01 06 00.43	+10.533	+6 20 32.7	+63.87	1.65	0.42	1.317 4023	— 2219 09 21.7	
23	01 06 41.73	10.109	6 24 42.7	61.09	1.65	0.42	316 4794	2395 09 06.7	
27	01 07 21.26	9.655	6 28 41.2	58.12	1.66	0.43	315 4878	2561 08 51.6	
31	01 07 58.93	9.174	6 32 27.5	55.01	1.66	0.43	314 4316	2718 08 36.5	
June 4	01 08 34.61	8.661	6 36 01.1	51.76	1.67	0.43	313 3145	2866 08 21.4	
8	01 09 08.18	+ 8.118	+6 39 21.3	+48.30	1.67	0.43	1.312 1404	— 3003 08 06.2	
12	01 09 39.52	7.550	6 42 27.3	44.69	1.68	0.43	310 9134	3130 07 51.0	
16	01 10 08.54	6.953	6 45 18.6	40.91	1.68	0.43	309 6378	3246 07 35.7	
20	01 10 35.11	6.329	6 47 54.4	37.00	1.69	0.43	308 3187	3347 07 20.4	
24	01 10 59.14	5.683	6 50 14.5	33.00	1.69	0.43	306 9619	3434 07 05.1	
28	01 11 20.55	+ 5.021	+6 52 18.3	+28.90	1.70	0.44	1.305 5730	— 3508 06 49.7	
July 2	01 11 39.29	+ 4.345	+6 54 05.6	+24.74	1.70	0.44	1.304 1576	— 3568 06 34.3	

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	^h ^m ^s	^s	[°] ['] ["]	["]	["]	["]			^h ^m
July 2	01 11 39.29	+4.345	+6 54 05.6	+24.74	1.70	0.44	1.304 1576	-3568	06 34.3
6	01 11 55.30	3.654	6 55 36.1	20.48	1.71	0.44	.302 7207	3615	06 18.8
10	01 12 08.50	2.946	6 56 49.3	16.12	1.71	0.44	.301 2679	3647	06 03.3
14	01 12 18.85	2.225	6 57 45.0	11.73	1.72	0.44	.299 8057	3662	05 47.8
18	01 12 26.29	1.497	6 58 23.1	7.29	1.72	0.44	.298 3407	3661	05 32.2
22	01 12 30.82	+0.767	+6 58 43.3	+ 2.84	1.73	0.44	1.296 8795	-3642	05 16.5
26	01 12 32.43	+0.039	6 58 45.9	- 1.55	1.74	0.45	.295 4295	3606	05 00.8
30	01 12 31.14	-0.685	6 58 30.9	5.93	1.74	0.45	.293 9965	3555	04 45.0
Aug. 3	01 12 26.97	1.400	6 57 58.5	10.25	1.75	0.45	.292 5877	3487	04 29.2
7	01 12 19.95	2.109	6 57 09.0	14.51	1.75	0.45	.291 2090	3403	04 13.4
11	01 12 10.11	-2.810	+6 56 02.5	-18.73	1.76	0.45	1.289 8674	-3301	03 57.5
15	01 11 57.49	3.494	6 54 39.3	22.85	1.76	0.45	.288 5702	3181	03 41.6
19	01 11 42.19	4.151	6 52 59.9	26.80	1.77	0.45	.287 3247	3043	03 25.6
23	01 11 24.32	4.780	6 51 05.2	30.53	1.77	0.46	.286 1376	2890	03 09.6
27	01 11 03.99	5.379	6 48 55.9	34.11	1.78	0.46	.285 0148	2721	02 53.5
31	01 10 41.33	-5.946	+6 46 32.6	-37.49	1.78	0.46	1.283 9626	-2538	02 37.4
Sept. 4	01 10 16.47	6.479	6 43 56.3	40.63	1.79	0.46	.282 9861	2341	02 21.3
8	01 09 49.55	6.974	6 41 07.8	43.60	1.79	0.46	.282 0916	2129	02 05.1
12	01 09 20.74	7.423	6 38 07.9	46.25	1.79	0.46	.281 2846	1903	01 48.9
16	01 08 50.23	7.823	6 34 58.2	48.57	1.80	0.46	.280 5707	1665	01 32.6
20	01 08 18.23	-8.169	+6 31 39.7	-50.61	1.80	0.46	1.279 9542	-1416	01 16.4
24	01 07 44.95	8.461	6 28 13.8	52.28	1.80	0.46	.279 4387	1160	01 00.1
28	01 07 10.62	8.696	6 24 41.9	53.60	1.80	0.46	.279 0271	897	00 43.8
Oct. 2	01 06 35.46	8.878	6 21 05.4	54.62	1.80	0.46	.278 7222	627	00 27.5
6	01 05 59.67	9.003	6 17 25.4	55.31	1.81	0.46	.278 5261	352	00 11.2
10	01 05 23.52	-9.064	+6 13 43.5	-55.57	1.81	0.46	1.278 4411	- 72	23 50.8
14	01 04 47.24	9.062	6 10 01.4	55.44	1.81	0.46	.278 4683	+ 209	23 34.5
18	01 04 11.11	8.994	6 06 20.5	54.90	1.80	0.46	.278 6080	489	23 18.1
22	01 03 35.37	8.864	6 02 42.7	53.96	1.80	0.46	.278 8590	766	23 01.8
26	01 03 00.28	8.672	5 59 09.3	52.68	1.80	0.46	.279 2198	1037	22 45.5
30	01 02 26.07	-8.424	+5 55 41.7	-51.06	1.80	0.46	1.279 6881	+1304	22 29.2
Nov. 3	01 01 52.96	8.122	5 52 21.3	49.08	1.80	0.46	.280 2619	1564	22 12.9
7	01 01 21.17	7.761	5 49 09.7	46.71	1.80	0.46	.280 9384	1817	21 56.7
11	01 00 50.95	7.341	5 46 08.1	44.02	1.79	0.46	.281 7138	2059	21 40.5
15	01 00 22.51	6.869	5 43 18.0	40.96	1.79	0.46	.282 5837	2288	21 24.3
19	00 59 56.06	-6.348	+5 40 40.8	-37.62	1.78	0.46	1.283 5423	+2503	21 08.1
23	00 59 31.78	5.785	5 38 17.4	34.03	1.78	0.46	.284 5839	2703	20 52.0
27	00 59 09.83	5.186	5 36 08.9	30.21	1.78	0.46	.285 7026	2887	20 35.9
Dec. 1	00 58 50.34	4.551	5 34 16.0	26.20	1.77	0.45	.286 8916	3056	20 19.9
5	00 58 33.47	3.880	5 32 39.6	21.96	1.77	0.45	.288 1454	3209	20 03.9
9	00 58 19.34	-3.179	+5 31 20.6	-17.52	1.76	0.45	1.289 4568	+3344	19 47.9
13	00 58 08.07	2.453	5 30 19.7	12.93	1.75	0.45	.290 8184	3460	19 32.0
17	00 57 59.74	1.710	5 29 37.3	8.23	1.75	0.45	.292 2221	3555	19 16.2
21	00 57 54.41	0.954	5 29 13.9	- 3.48	1.74	0.45	.293 6601	3631	19 00.4
25	00 57 52.12	-0.190	5 29 09.5	+ 1.28	1.74	0.45	.295 1245	3688	18 44.6
29	00 57 52.90	+0.580	+5 29 24.2	+ 6.10	1.73	0.44	1.296 6082	+3727	18 28.9
33	00 57 56.76	+1.351	+5 29 58.3	+10.93	1.73	0.44	1.298 1041	+3749	18 13.3

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	^h ^m ^s	^s	[°] ['] ["]	["]	["]	["]			^h ^m
Jan. -1	10 30 54.55	-2.612	+10 05 54.5	+17.32	1.23	0.30	1.471 6621	-2157	03 59.4
3	10 30 43.18	3.070	10 07 09.0	19.92	1.24	0.30	.470 8184	2060	03 43.5
7	10 30 30.02	3.506	10 08 33.7	22.40	1.24	0.30	.470 0157	1952	03 27.5
11	10 30 15.16	3.922	10 10 08.0	24.75	1.24	0.30	.469 2581	1834	03 11.6
15	10 29 58.68	4.314	10 11 51.5	26.96	1.24	0.30	.468 5500	1704	02 55.6
19	10 29 40.69	-4.677	+10 13 43.4	+28.96	1.24	0.30	1.467 8958	-1565	02 39.5
23	10 29 21.31	5.008	10 15 43.0	30.81	1.25	0.30	.467 2990	1417	02 23.5
27	10 29 00.67	5.308	10 17 49.6	32.42	1.25	0.30	.466 7632	1260	02 07.4
31	10 28 38.90	5.568	10 20 02.0	33.77	1.25	0.30	.466 2916	1097	01 51.3
Feb 4	10 28 16.18	5.789	10 22 19.5	34.95	1.25	0.30	.465 8862	929	01 35.2
8	10 27 52.63	-5.980	+10 24 41.3	+35.91	1.25	0.30	1.465 5488	-756	01 19.1
12	10 27 28.39	6.133	10 27 06.5	36.65	1.25	0.30	.465 2818	578	01 03.0
16	10 27 03.62	6.245	10 29 34.2	37.14	1.25	0.30	.465 0868	397	00 46.9
20	10 26 38.49	6.312	10 32 03.3	37.38	1.25	0.30	.464 9649	212	00 30.7
24	10 26 13.18	6.337	10 34 32.9	37.37	1.25	0.30	.464 9171	-28	00 14.5
28	10 25 47.85	-6.319	+10 37 01.9	+37.10	1.25	0.30	1.464 9426	+155	23 54.4
Mar. 4	10 25 22.68	6.264	10 39 29.4	36.63	1.25	0.30	.465 0410	336	23 38.2
8	10 24 57.79	6.173	10 41 54.6	35.91	1.25	0.30	.465 2113	515	23 22.1
12	10 24 33.35	6.039	10 44 16.4	35.00	1.25	0.30	.465 4530	692	23 06.0
16	10 24 09.53	5.869	10 46 34.3	33.89	1.25	0.30	.465 7641	864	22 49.8
20	10 23 46.46	-5.659	+10 48 47.2	+32.55	1.25	0.30	1.466 1432	+1031	22 33.7
24	10 23 24.31	5.410	10 50 54.4	31.00	1.25	0.30	.466 5878	1191	22 17.6
28	10 23 03.22	5.130	10 52 54.9	29.22	1.25	0.30	.467 0948	1343	22 01.5
Apr. 1	10 22 43.31	4.821	10 54 48.0	27.32	1.25	0.30	.467 6612	1487	21 45.5
5	10 22 24.69	4.483	10 56 33.3	25.29	1.24	0.30	.468 2832	1622	21 29.5
9	10 22 07.48	-4.119	+10 58 10.1	+23.12	1.24	0.30	1.468 9578	+1749	21 13.5
13	10 21 51.77	3.729	10 59 37.9	20.80	1.24	0.30	.469 6812	1867	20 57.5
17	10 21 37.68	3.316	11 00 56.3	18.36	1.24	0.30	.470 4501	1975	20 41.5
21	10 21 25.27	2.882	11 02 04.6	15.79	1.24	0.30	.471 2599	2071	20 25.6
25	10 21 14.65	2.428	11 03 02.5	13.14	1.23	0.30	.472 1057	2156	20 09.7
29	10 21 05.86	-1.966	+11 03 49.6	+10.40	1.23	0.30	1.472 9834	+2229	19 53.8
May 3	10 20 58.94	1.492	11 04 25.7	7.66	1.23	0.30	.473 8878	2291	19 38.0
7	10 20 53.94	1.006	11 04 50.9	4.90	1.23	0.29	.474 8152	2344	19 22.2
11	10 20 50.89	0.519	11 05 04.9	+2.08	1.22	0.29	.475 7613	2384	19 06.4
15	10 20 49.80	-0.022	11 05 07.5	-0.78	1.22	0.29	.476 7212	2414	18 50.7
19	10 20 50.72	+0.479	+11 04 58.7	-3.65	1.22	0.29	1.477 6909	+2432	18 35.0
23	10 20 53.63	0.978	11 04 38.3	6.51	1.21	0.29	.478 6649	2437	18 19.3
27	10 20 58.54	1.474	11 04 06.7	9.32	1.21	0.29	.479 6388	2431	18 03.7
31	10 21 05.41	1.960	11 03 23.8	12.10	1.21	0.29	.480 6082	2415	17 48.1
June 4	10 21 14.21	2.441	11 02 30.0	14.82	1.21	0.29	.481 5692	2389	17 32.5
8	10 21 24.93	+2.917	+11 01 25.3	-17.51	1.20	0.29	1.482 5178	+2353	17 16.9
12	10 21 37.53	3.381	11 00 10.0	20.13	1.20	0.29	.483 4503	2307	17 01.4
16	10 21 51.96	3.834	10 58 44.3	22.72	1.20	0.29	.484 3623	2251	16 46.0
20	10 22 08.18	4.272	10 57 08.4	25.20	1.20	0.29	.485 2497	2185	16 30.5
24	10 22 26.11	4.691	10 55 22.8	27.59	1.19	0.29	.486 1091	2110	16 15.1
28	10 22 45.69	+5.100	+10 53 27.8	-29.87	1.19	0.29	1.486 9366	+2027	15 59.7
July 2	10 23 06.86	+5.482	+10 51 24.0	-32.03	1.19	0.29	1.487 7295	+1936	15 44.3

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	^h ^m	^s	[°] ['] ["]	["]	["]	["]			^h ^m
July 2	10 23 06.86	+5.482	+10 51 24.0	-32.03	1.19	0.29	1.487 7295	+1936	15 44.3
6	10 23 29.52	5.846	10 49 11.7	34.11	1.19	0.29	.488 4847	1839	15 29.0
10	10 23 53.60	6.191	10 46 51.3	36.05	1.19	0.29	.489 1995	1734	15 13.6
14	10 24 19.02	6.517	10 44 23.4	37.91	1.18	0.28	.489 8712	1622	14 58.3
18	10 24 45.71	6.823	10 41 48.2	39.62	1.18	0.28	.490 4962	1502	14 43.0
22	10 25 13.57	+7.101	+10 39 06.6	-41.19	1.18	0.28	1.491 0722	+1377	14 27.8
26	10 25 42.48	7.349	10 36 18.9	42.61	1.18	0.28	.491 5973	1248	14 12.5
30	10 26 12.33	7.574	10 33 25.9	43.89	1.18	0.28	.492 0701	1114	13 57.3
Aug. 3	10 26 43.04	7.777	10 30 28.0	45.03	1.18	0.28	.492 4883	976	13 42.1
7	10 27 14.51	7.956	10 27 25.9	46.00	1.18	0.28	.492 8506	834	13 26.9
11	10 27 46.65	+8.106	+10 24 20.2	-46.85	1.17	0.28	1.493 1551	+ 688	13 11.7
15	10 28 19.32	8.227	10 21 11.3	47.54	1.17	0.28	.493 4006	539	12 56.5
19	10 28 52.43	8.320	10 18 00.1	48.04	1.17	0.28	.493 5863	388	12 41.3
23	10 29 25.84	8.381	10 14 47.2	48.38	1.17	0.28	.493 7108	235	12 26.2
27	10 29 59.44	8.416	10 11 33.3	48.54	1.17	0.28	.493 7740	+ 81	12 11.0
31	10 30 33.13	+8.423	+10 08 19.0	-48.55	1.17	0.28	1.493 7758	- 72	11 55.8
Sept. 4	10 31 06.79	8.404	10 05 05.1	48.40	1.17	0.28	.493 7160	227	11 40.6
8	10 31 40.32	8.355	10 01 52.0	48.09	1.17	0.28	.493 5945	381	11 25.5
12	10 32 13.59	8.277	9 58 40.6	47.59	1.17	0.28	.493 4114	535	11 10.3
16	10 32 46.49	8.167	9 55 31.5	46.92	1.17	0.28	.493 1666	688	10 55.1
20	10 33 18.88	+8.024	+ 9 52 25.5	-46.04	1.18	0.28	1.492 8616	- 837	10 39.9
24	10 33 50.65	7.857	9 49 23.4	45.01	1.18	0.28	.492 4973	984	10 24.7
28	10 34 21.70	7.663	9 46 25.6	43.84	1.18	0.28	.492 0750	1127	10 09.5
Oct. 2	10 34 51.92	7.444	9 43 32.9	42.50	1.18	0.28	.491 5964	1266	09 54.3
6	10 35 21.21	7.195	9 40 45.8	40.99	1.18	0.28	.491 0628	1401	09 39.1
10	10 35 49.44	+6.918	+ 9 38 05.2	-39.30	1.18	0.28	1.490 4759	-1533	09 23.8
14	10 36 16.52	6.615	9 35 31.6	37.47	1.18	0.28	.489 8375	1658	09 08.5
18	10 36 42.32	6.283	9 33 05.7	35.46	1.19	0.29	.489 1506	1776	08 53.2
22	10 37 06.75	5.929	9 30 48.1	33.32	1.19	0.29	.488 4179	1886	08 37.9
26	10 37 29.72	5.553	9 28 39.3	31.04	1.19	0.29	.487 6429	1989	08 22.5
30	10 37 51.15	+5.160	+ 9 26 39.9	-28.66	1.19	0.29	1.486 8280	-2084	08 07.1
Nov. 3	10 38 10.97	4.744	9 24 50.2	26.15	1.19	0.29	.485 9766	2172	07 51.7
7	10 38 29.07	4.304	9 23 10.9	23.51	1.20	0.29	.485 0919	2250	07 36.3
11	10 38 45.38	3.846	9 21 42.3	20.76	1.20	0.29	.484 1779	2318	07 20.9
15	10 38 59.82	3.375	9 20 25.0	17.89	1.20	0.29	.483 2387	2376	07 05.4
19	10 39 12.36	+2.891	+ 9 19 19.3	-14.97	1.20	0.29	1.482 2789	-2422	06 49.8
23	10 39 22.93	2.394	9 18 25.4	12.00	1.21	0.29	.481 3029	2457	06 34.3
27	10 39 31.50	1.891	9 17 43.4	8.98	1.21	0.29	.480 3150	2481	06 18.7
Dec. 1	10 39 38.05	1.381	9 17 13.6	5.90	1.21	0.29	.479 3199	2493	06 03.1
5	10 39 42.54	0.863	9 16 56.2	- 2.80	1.22	0.29	.478 3222	2494	05 47.4
9	10 39 44.95	+0.343	+ 9 16 51.2	+ 0.29	1.22	0.29	1.477 3263	-2482	05 31.7
13	10 39 45.28	-0.178	9 16 58.5	3.38	1.22	0.29	.476 3380	2457	05 16.0
17	10 39 43.53	0.694	9 17 18.2	6.45	1.22	0.29	.475 3623	2419	05 00.3
21	10 39 39.74	1.200	9 17 50.0	9.45	1.23	0.30	.474 4048	2367	04 44.5
25	10 39 33.94	1.700	9 18 33.7	12.36	1.23	0.30	.473 4698	2305	04 28.6
29	10 39 26.16	-2.187	+ 9 19 28.8	+15.21	1.23	0.30	1.472 5621	-2231	04 12.7
33	10 39 16.47	-2.656	+ 9 20 35.3	+17.98	1.23	0.30	1.471 6864	-2145	03 56.9

AT TRANSIT AT GREENWICH.

Date.	Apparent Right Ascension.	Var. per Hour of Long.	Sidereal Time of S. D. passing Meridian.	Apparent Declination.	Var. per Hour of Long.	Semi- diameter.	Hori- zontal Parallax.
Jan. 1	^h 15 ^m 48 ^s 35.06	+ 6.244	^s 1.33	[°] 15 47 31.6	-13.73	19.23	20.12
2	15 51 07.54	6.462	1.31	15 53 14.5	14.83	18.93	19.80
3	15 53 45.17	6.673	1.29	15 59 22.7	15.84	18.63	19.50
4	15 56 27.80	6.878	1.27	16 05 54.1	16.76	18.34	19.20
5	15 59 15.28	7.077	1.25	16 12 46.7	17.60	18.06	18.90
6	16 02 07.46	+ 7.271	1.24	-16 19 58.2	-18.35	17.79	18.61
7	16 05 04.22	7.458	1.22	16 27 26.9	19.02	17.52	18.33
8	16 08 05.41	7.640	1.20	16 35 10.7	19.61	17.26	18.06
9	16 11 10.88	7.815	1.18	16 43 07.6	20.12	17.01	17.79
10	16 14 20.50	7.986	1.17	16 51 15.8	20.55	16.76	17.54
11	16 17 34.15	+ 8.151	1.15	-16 59 33.3	-20.90	16.52	17.29
12	16 20 51.70	8.311	1.14	17 07 58.4	21.18	16.28	17.04
13	16 24 13.02	8.465	1.12	17 16 29.3	21.38	16.05	16.79
14	16 27 37.99	8.615	1.11	17 25 04.3	21.52	15.82	16.56
15	16 31 06.50	8.760	1.09	17 33 41.8	21.59	15.60	16.33
16	16 34 38.43	+ 8.901	1.08	-17 42 20.1	-21.59	15.39	16.11
17	16 38 13.69	9.037	1.06	17 50 57.6	21.53	15.18	15.89
18	16 41 52.16	9.169	1.05	17 59 32.9	21.40	14.98	15.67
19	16 45 33.75	9.297	1.04	18 08 04.5	21.22	14.78	15.47
20	16 49 18.37	9.421	1.02	18 16 31.0	20.98	14.59	15.27
21	16 53 05.91	+ 9.541	1.01	-18 24 51.0	-20.68	14.40	15.07
22	16 56 56.30	9.658	1.00	18 33 03.2	20.33	14.21	14.87
23	17 00 49.45	9.771	0.99	18 41 06.5	19.93	14.03	14.68
24	17 04 45.29	9.881	0.98	18 48 59.5	19.48	13.86	14.50
25	17 08 43.73	9.988	0.97	18 56 41.0	18.98	13.69	14.32
26	17 12 44.69	+10.091	0.95	-19 04 09.9	-18.43	13.52	14.15
27	17 16 48.09	10.192	0.94	19 11 25.0	17.83	13.36	13.98
28	17 20 53.88	10.290	0.93	19 18 25.3	17.19	13.20	13.81
29	17 25 01.97	10.384	0.92	19 25 09.6	16.50	13.04	13.64
30	17 29 12.30	10.476	0.91	19 31 36.9	15.77	12.88	13.48
31	17 33 24.81	+10.565	0.90	-19 37 46.4	-15.01	12.73	13.32
Feb. 1	17 37 39.42	10.652	0.89	19 43 36.9	14.20	12.59	13.17
2	17 41 56.07	10.735	0.88	19 49 07.6	13.35	12.45	13.02
3	17 46 14.69	10.816	0.87	19 54 17.4	12.47	12.31	12.88
4	17 50 35.23	10.895	0.86	19 59 05.7	11.55	12.17	12.74
5	17 54 57.62	+10.970	0.85	-20 03 31.6	-10.60	12.04	12.60
6	17 59 21.77	11.042	0.85	20 07 34.1	9.61	11.91	12.46
7	18 03 47.61	11.111	0.84	20 11 12.5	8.59	11.78	12.32
8	18 08 15.09	11.178	0.83	20 14 26.0	7.54	11.65	12.19
9	18 12 44.13	11.241	0.82	20 17 14.0	6.46	11.53	12.06
10	18 17 14.65	+11.301	0.81	-20 19 35.7	-5.35	11.41	11.94
11	18 21 46.57	11.358	0.80	20 21 30.6	4.22	11.29	11.82
12	18 26 19.83	11.412	0.79	20 22 58.0	3.06	11.18	11.69
13	18 30 54.34	11.463	0.79	20 23 57.3	1.88	11.06	11.57
14	18 35 30.03	11.511	0.78	20 24 28.2	-0.69	10.95	11.46
15	18 40 06.83	+11.555	0.77	-20 24 30.1	+0.53	10.85	11.35
16	18 44 44.67	+11.597	0.76	20 24 02.6	+1.77	10.74	11.24

AT TRANSIT AT GREENWICH.

Date.	Apparent Right Ascension.	Var. per Hour of Long.	Sidereal Time of S. D. passing Meridian.	Apparent Declination.	Var. per Hour of Long.	Semi- diameter.	Hori- zontal Parallax.
Feb. 16	^h 18 ^m 44 ^s 44.67	+11.597	0.76	—20 24 02.6	+ 1.77	10.74	11.24
17	18 49 23.48	11.636	0.76	20 23 05.2	3.02	10.63	11.13
18	18 54 03.18	11.672	0.75	20 21 37.7	4.28	10.53	11.02
19	18 58 43.71	11.705	0.74	20 19 39.6	5.56	10.44	10.92
20	19 03 25.01	11.736	0.74	20 17 10.7	6.85	10.34	10.82
21	19 08 07.01	+11.764	0.73	—20 14 10.8	+ 8.15	10.25	10.72
22	19 12 49.64	11.789	0.72	20 10 39.6	9.45	10.15	10.62
23	19 17 32.85	11.811	0.71	20 06 36.9	10.77	10.06	10.53
24	19 22 16.56	11.831	0.71	20 02 02.6	12.09	9.97	10.43
25	19 27 00.73	11.849	0.70	19 56 56.6	13.41	9.88	10.34
26	19 31 45.30	+11.865	0.69	—19 51 18.7	+14.74	9.79	10.25
27	19 36 30.22	11.878	0.69	19 45 08.9	16.07	9.71	10.16
28	19 41 15.42	11.889	0.68	19 38 27.2	17.41	9.62	10.07
Mar. 1	19 46 00.86	11.898	0.67	19 31 13.4	18.74	9.54	9.99
2	19 50 46.49	11.904	0.67	19 23 27.6	20.07	9.46	9.90
3	19 55 32.26	+11.909	0.66	—19 15 09.9	+21.40	9.38	9.82
4	20 00 18.13	11.913	0.66	19 06 20.3	22.73	9.31	9.74
5	20 05 04.05	11.914	0.65	18 56 58.8	24.06	9.23	9.66
6	20 09 49.98	11.913	0.64	18 47 05.5	25.38	9.15	9.58
7	20 14 35.87	11.911	0.64	18 36 40.7	26.69	9.08	9.50
8	20 19 21.67	+11.906	0.63	—18 25 44.4	+28.00	9.01	9.43
9	20 24 07.34	11.900	0.63	18 14 16.9	29.29	8.94	9.35
10	20 28 52.84	11.892	0.62	18 02 18.4	30.58	8.87	9.28
11	20 33 38.13	11.882	0.62	17 49 49.2	31.85	8.80	9.21
12	20 38 23.16	11.870	0.61	17 36 49.5	33.12	8.73	9.14
13	20 43 07.90	+11.857	0.61	—17 23 19.6	+34.37	8.67	9.07
14	20 47 52.31	11.843	0.60	17 09 20.0	35.60	8.60	9.00
15	20 52 36.35	11.827	0.60	16 54 50.9	36.82	8.54	8.93
16	20 57 20.00	11.810	0.59	16 39 52.8	38.02	8.48	8.87
17	21 02 03.22	11.791	0.58	16 24 26.1	39.20	8.41	8.80
18	21 06 45.98	+11.772	0.58	—16 08 31.2	+40.37	8.35	8.74
19	21 11 28.25	11.751	0.57	15 52 08.6	41.51	8.29	8.68
20	21 16 10.03	11.730	0.57	15 35 18.6	42.65	8.24	8.62
21	21 20 51.28	11.708	0.57	15 18 01.7	43.75	8.18	8.56
22	21 25 31.99	11.685	0.56	15 00 18.6	44.84	8.12	8.50
23	21 30 12.15	+11.661	0.56	—14 42 09.5	+45.91	8.07	8.44
24	21 34 51.74	11.638	0.55	14 23 35.1	46.95	8.01	8.38
25	21 39 30.76	11.614	0.55	14 04 35.9	47.98	7.96	8.33
26	21 44 09.19	11.589	0.54	13 45 12.4	48.98	7.90	8.27
27	21 48 47.02	11.564	0.54	13 25 25.2	49.96	7.85	8.22
28	21 53 24.26	+11.539	0.53	—13 05 14.6	+50.92	7.80	8.16
29	21 58 00.91	11.515	0.53	12 44 41.4	51.85	7.75	8.11
30	22 02 36.97	11.490	0.53	12 23 46.0	52.76	7.70	8.06
31	22 07 12.44	11.466	0.52	12 02 29.0	53.65	7.65	8.00
Apr. 1	22 11 47.34	11.442	0.52	11 40 50.9	54.52	7.60	7.95
2	22 16 21.66	+11.418	0.51	—11 18 52.3	+55.36	7.55	7.90
3	22 20 55.42	+11.395	0.51	—10 56 33.7	+56.18	7.51	7.86

AT TRANSIT AT GREENWICH.

Date.	Apparent Right Ascension.	Var. per Hour of Long.	Sidereal Time of S. D. passing Meridian.	Apparent Declination.	Var. per Hour of Long.	Semi- diameter.	Hori- zontal Parallax.
Apr. 1	^h 22 ^m 11 ^s 47.34	+11.442	^s 0.52	[°] -11 ['] 40 ["] 50.9	+54.52	7.60	7.95
2	22 16 21.66	11.418	0.51	11 18 52.3	55.36	7.55	7.90
3	22 20 55.42	11.395	0.51	10 56 33.7	56.18	7.51	7.86
4	22 25 28.63	11.373	0.51	10 33 55.7	56.98	7.46	7.81
5	22 30 01.31	11.350	0.50	10 10 58.9	57.75	7.42	7.76
6	22 34 33.45	+11.328	0.50	- 9 47 43.9	+58.50	7.37	7.71
7	22 39 05.08	11.307	0.50	9 24 11.3	59.22	7.33	7.67
8	22 43 36.21	11.287	0.49	9 00 21.7	59.91	7.28	7.62
9	22 48 06.84	11.267	0.49	8 36 15.7	60.58	7.24	7.57
10	22 52 37.00	11.247	0.49	8 11 54.0	61.22	7.20	7.53
11	22 57 06.69	+11.227	0.48	- 7 47 17.2	+61.84	7.16	7.49
12	23 01 35.93	11.209	0.48	7 22 25.9	62.43	7.11	7.44
13	23 06 04.75	11.192	0.48	6 57 20.8	62.99	7.07	7.40
14	23 10 33.16	11.175	0.47	6 32 02.6	63.53	7.03	7.36
15	23 15 01.18	11.160	0.47	6 06 31.8	64.03	7.00	7.32
16	23 19 28.84	+11.145	0.47	- 5 40 49.3	+64.51	6.96	7.28
17	23 23 56.15	11.131	0.46	5 14 55.5	64.96	6.92	7.24
18	23 28 23.13	11.118	0.46	4 48 51.3	65.39	6.88	7.20
19	23 32 49.81	11.106	0.46	4 22 37.2	65.78	6.84	7.16
20	23 37 16.22	11.095	0.45	3 56 13.9	66.15	6.81	7.13
21	23 41 42.38	+11.085	0.45	- 3 29 42.1	+66.49	6.78	7.09
22	23 46 08.32	11.076	0.45	3 03 02.4	66.81	6.74	7.05
23	23 50 34.06	11.069	0.45	2 36 15.4	67.10	6.71	7.02
24	23 54 59.64	11.063	0.44	2 09 21.9	67.36	6.67	6.98
25	23 59 25.09	11.058	0.44	1 42 22.4	67.59	6.64	6.95
26	00 03 50.44	+11.055	0.44	- 1 15 17.7	+67.80	6.61	6.91
27	00 08 15.72	11.052	0.44	0 48 08.3	67.98	6.58	6.88
28	00 12 40.96	11.051	0.44	- 0 20 54.9	68.13	6.55	6.85
29	00 17 06.20	11.052	0.43	+ 0 06 21.9	68.26	6.51	6.81
30	00 21 31.48	11.055	0.43	0 33 41.5	68.37	6.48	6.78
May 1	00 25 56.83	+11.058	0.43	+ 1 01 03.3	+68.44	6.45	6.75
2	00 30 22.29	11.064	0.43	1 28 26.5	68.49	6.42	6.72
3	00 34 47.90	11.070	0.43	1 55 50.7	68.52	6.39	6.69
4	00 39 13.68	11.079	0.42	2 23 15.1	68.51	6.36	6.66
5	00 43 39.68	11.088	0.42	2 50 39.0	68.48	6.34	6.63
6	00 48 05.92	+11.099	0.42	+ 3 18 01.9	+68.42	6.31	6.60
7	00 52 32.45	11.112	0.42	3 45 23.1	68.34	6.28	6.57
8	00 56 59.29	11.125	0.42	4 12 41.8	68.22	6.25	6.54
9	01 01 26.47	11.140	0.42	4 39 57.4	68.08	6.22	6.51
10	01 05 54.04	11.157	0.41	5 07 09.3	67.91	6.19	6.48
11	01 10 22.03	+11.175	0.41	+ 5 34 16.7	+67.70	6.16	6.45
12	01 14 50.46	11.194	0.41	6 01 18.9	67.48	6.14	6.42
13	01 19 19.37	11.215	0.41	6 28 15.4	67.22	6.12	6.40
14	01 23 48.79	11.237	0.41	6 55 05.3	66.93	6.09	6.37
15	01 28 18.75	11.260	0.41	7 21 48.0	66.62	6.06	6.34
16	01 32 49.28	+11.284	0.41	+ 7 48 22.8	+66.27	6.04	6.32
17	01 37 20.41	+11.310	0.41	+ 8 14 48.9	+65.90	6.01	6.29

AT TRANSIT AT GREENWICH.

Date.	Apparent Right Ascension.	Var. per Hour of Long.	Sidereal Time of S. D. passing Meridian.	Apparent Declination.	Var. per Hour of Long.	Semi- diameter.	Hori- zontal Parallax.
May	^h ^m ^s	^s	^s	[°] ['] ["]			
	17 01 37 20.41	+11.310	0.41	+ 8 14 48.9	+65.90	6.01	6.29
	18 01 41 52.17	11.337	0.40	8 41 05.7	65.50	5.99	6.27
	19 01 46 24.59	11.365	0.40	9 07 12.5	65.06	5.96	6.24
	20 01 50 57.70	11.394	0.40	9 33 08.5	64.60	5.94	6.22
	21 01 55 31.52	11.425	0.40	9 58 53.2	64.11	5.92	6.19
	22 02 00 06.09	+11.456	0.40	+10 24 25.7	+63.59	5.90	6.17
	23 02 04 41.42	11.489	0.40	10 49 45.3	63.04	5.88	6.15
	24 02 09 17.56	11.523	0.40	11 14 51.5	62.47	5.85	6.12
	25 02 13 54.53	11.558	0.40	11 39 43.5	61.86	5.83	6.10
	26 02 18 32.35	11.594	0.40	12 04 20.7	61.23	5.81	6.08
	27 02 23 11.06	+11.632	0.40	+12 28 42.2	+60.56	5.79	6.06
	28 02 27 50.68	11.670	0.39	12 52 47.5	59.87	5.76	6.03
	29 02 32 31.24	11.710	0.39	13 16 35.9	59.15	5.74	6.01
	30 02 37 12.76	11.750	0.39	13 40 06.6	58.40	5.72	5.99
	31 02 41 55.27	11.792	0.39	14 03 19.1	57.63	5.71	5.97
June	1 02 46 38.78	+11.834	0.39	+14 26 12.6	+56.82	5.69	5.95
	2 02 51 23.32	11.878	0.39	14 48 46.4	55.99	5.67	5.93
	3 02 56 08.92	11.922	0.39	15 10 59.8	55.12	5.65	5.91
	4 03 00 55.58	11.967	0.39	15 32 52.1	54.23	5.63	5.89
	5 03 05 43.32	12.012	0.39	15 54 22.7	53.31	5.61	5.87
	6 03 10 32.15	+12.057	0.39	+16 15 30.7	+52.35	5.59	5.85
	7 03 15 22.08	12.103	0.39	16 36 15.5	51.37	5.57	5.83
	8 03 20 13.12	12.150	0.39	16 56 36.4	50.36	5.56	5.82
	9 03 25 05.29	12.197	0.39	17 16 32.7	49.32	5.54	5.80
	10 03 29 58.57	12.244	0.39	17 36 03.6	48.25	5.52	5.78
	11 03 34 52.99	+12.291	0.39	+17 55 08.5	+47.15	5.51	5.76
	12 03 39 48.53	12.338	0.39	18 13 46.7	46.03	5.50	5.75
	13 03 44 45.20	12.385	0.39	18 31 57.5	44.87	5.48	5.73
	14 03 49 42.99	12.431	0.38	18 49 40.3	43.69	5.46	5.71
	15 03 54 41.88	12.477	0.38	19 06 54.3	42.47	5.45	5.70
	16 03 59 41.89	+12.523	0.38	+19 23 38.8	+41.23	5.43	5.68
	17 04 04 42.98	12.568	0.38	19 39 53.3	39.97	5.42	5.67
	18 04 09 45.16	12.613	0.38	19 55 37.1	38.67	5.40	5.65
	19 04 14 48.39	12.657	0.38	20 10 49.5	37.35	5.39	5.64
	20 04 19 52.68	12.700	0.38	20 25 29.9	36.01	5.37	5.62
	21 04 24 57.99	+12.742	0.38	+20 39 37.8	+34.64	5.36	5.61
	22 04 30 04.31	12.784	0.38	20 53 12.6	33.25	5.34	5.59
	23 04 35 11.62	12.825	0.38	21 06 13.7	31.84	5.33	5.58
	24 04 40 19.88	12.864	0.38	21 18 40.5	30.40	5.31	5.56
	25 04 45 29.09	12.903	0.38	21 30 32.6	28.94	5.30	5.55
	26 04 50 39.20	+12.940	0.38	+21 41 49.3	+27.46	5.29	5.54
	27 04 55 50.19	12.976	0.38	21 52 30.3	25.96	5.28	5.52
	28 05 01 02.03	13.011	0.38	22 02 35.0	24.43	5.27	5.51
	29 05 06 14.70	13.044	0.38	22 12 02.9	22.89	5.26	5.50
	30 05 11 28.14	13.076	0.38	22 20 53.6	21.33	5.25	5.49
July	1 05 16 42.33	+13.106	0.38	+22 29 06.8	+19.76	5.23	5.47
	2 05 21 57.23	+13.135	0.38	+22 36 41.9	+18.16	5.22	5.46

VENUS, 1931.

AT TRANSIT AT GREENWICH.

Date.	Apparent Right Ascension.	Var. per Hour of Long.	Sidereal Time of S. D. passing Meridian.	Apparent Declination.	Var. per Hour of Long.	Semi- diameter.	Hori- zontal Parallax.
July 1	^h 05 ^m 16 ^s 42.33	+13.106	0.38	+22 29 06.8	+19.76	5.23	5.47
2	05 21 57.23	13.135	0.38	22 36 41.9	18.16	5.22	5.46
3	05 27 12.80	13.162	0.38	22 43 38.6	16.56	5.21	5.45
4	05 32 28.99	13.187	0.38	22 49 56.6	14.94	5.20	5.44
5	05 37 45.77	13.210	0.38	22 55 35.5	13.30	5.19	5.43
6	05 43 03.07	+13.231	0.38	+23 00 34.9	+11.65	5.18	5.42
7	05 48 20.85	13.250	0.37	23 04 54.6	9.99	5.16	5.40
8	05 53 39.06	13.267	0.37	23 08 34.3	8.32	5.15	5.39
9	05 58 57.65	13.282	0.37	23 11 33.8	6.64	5.14	5.38
10	06 04 16.56	13.294	0.37	23 13 52.9	4.95	5.13	5.37
11	06 09 35.75	+13.304	0.37	+23 15 31.4	+ 3.25	5.12	5.36
12	06 14 55.15	13.312	0.37	23 16 29.0	+ 1.55	5.11	5.35
13	06 20 14.71	13.318	0.37	23 16 45.8	- 0.15	5.10	5.34
14	06 25 34.37	13.321	0.37	23 16 21.6	1.86	5.09	5.33
15	06 30 54.09	13.321	0.37	23 15 16.4	3.57	5.08	5.32
16	06 36 13.78	+13.319	0.37	+23 13 30.2	- 5.28	5.08	5.32
17	06 41 33.40	13.315	0.37	23 11 02.9	6.99	5.07	5.31
18	06 46 52.89	13.309	0.37	23 07 54.6	8.70	5.07	5.30
19	06 52 12.19	13.299	0.37	23 04 05.4	10.40	5.06	5.29
20	06 57 31.25	13.289	0.37	22 59 35.3	12.10	5.05	5.28
21	07 02 50.03	+13.275	0.36	+22 54 24.6	-13.79	5.04	5.27
22	07 08 08.45	13.259	0.36	22 48 33.4	15.47	5.03	5.26
23	07 13 26.47	13.242	0.36	22 42 01.9	17.15	5.03	5.26
24	07 18 44.05	13.223	0.36	22 34 50.2	18.82	5.02	5.25
25	07 24 01.14	13.201	0.36	22 26 58.6	20.48	5.01	5.24
26	07 29 17.69	+13.178	0.36	+22 18 27.4	-22.12	5.01	5.24
27	07 34 33.67	13.153	0.36	22 09 16.8	23.76	5.00	5.23
28	07 39 49.02	13.126	0.36	21 59 27.2	25.38	4.99	5.22
29	07 45 03.70	13.098	0.36	21 48 58.9	26.98	4.99	5.22
30	07 50 17.69	13.068	0.36	21 37 52.3	28.57	4.98	5.21
31	07 55 30.94	+13.036	0.36	+21 26 07.7	-30.15	4.97	5.20
Aug. 1	08 00 43.43	13.004	0.36	21 13 45.5	31.70	4.97	5.20
2	08 05 55.10	12.969	0.35	21 00 46.3	33.24	4.96	5.19
3	08 11 05.93	12.934	0.35	20 47 10.3	34.76	4.96	5.19
4	08 16 15.91	12.897	0.35	20 32 58.0	36.26	4.95	5.18
5	08 21 24.99	+12.860	0.35	+20 18 10.1	-37.73	4.94	5.17
6	08 26 33.16	12.821	0.35	20 02 46.9	39.19	4.94	5.17
7	08 31 40.38	12.781	0.35	19 46 49.0	40.63	4.93	5.16
8	08 36 46.65	12.741	0.35	19 30 17.0	42.04	4.93	5.16
9	08 41 51.94	12.700	0.35	19 13 11.3	43.43	4.93	5.16
10	08 46 56.23	+12.658	0.35	+18 55 32.6	-44.79	4.92	5.15
11	08 51 59.50	12.615	0.35	18 37 21.4	46.13	4.92	5.15
12	08 57 01.75	12.572	0.34	18 18 38.4	47.45	4.91	5.14
13	09 02 02.96	12.529	0.34	17 59 24.2	48.73	4.91	5.14
14	09 07 03.12	12.485	0.34	17 39 39.4	49.99	4.91	5.14
15	09 12 02.23	+12.441	0.34	+17 19 24.8	-51.22	4.90	5.13
16	09 17 00.28	+12.397	0.34	+16 58 40.9	-52.43	4.90	5.13

AT TRANSIT AT GREENWICH.

Date.	Apparent Right Ascension.	Var. per Hour of Long.	Sidereal Time of S. D. passing Meridian.	Apparent Declination.	Var. per Hour of Long.	Semi- diameter.	Hori- zontal Parallax.
Aug. 16	^h 09 ^m 17 ^s 00.28	+12.397	0.34	+16° 58' 40.9"	-52.43	4.90	5.13
17	09 21 57.27	12.352	0.34	16 37 28.5	53.60	4.89	5.12
18	09 26 53.19	12.308	0.34	16 15 48.2	54.75	4.89	5.12
19	09 31 48.06	12.264	0.34	15 53 40.7	55.87	4.89	5.12
20	09 36 41.88	12.221	0.34	15 31 06.7	56.96	4.89	5.12
21	09 41 34.65	+12.177	0.34	+15 08 06.9	-58.02	4.88	5.11
22	09 46 26.39	12.135	0.34	14 44 42.0	59.05	4.88	5.11
23	09 51 17.12	12.093	0.34	14 20 52.7	60.05	4.88	5.11
24	09 56 06.84	12.051	0.34	13 56 39.7	61.03	4.88	5.11
25	10 00 55.57	12.010	0.33	13 32 03.6	61.97	4.88	5.11
26	10 05 43.33	+11.970	0.33	+13 07.05.3	-62.89	4.87	5.10
27	10 10 30.14	11.931	0.33	12 41.45.3	63.77	4.87	5.10
28	10 15 16.04	11.894	0.33	12 16.04.4	64.63	4.87	5.10
29	10 20 01.04	11.856	0.33	11 50 03.3	65.46	4.87	5.10
30	10 24 45.16	11.820	0.33	11 23 42.7	66.25	4.87	5.10
31	10 29 28.43	+11.786	0.33	+10 57 03.4	-67.02	4.87	5.10
Sept. 1	10 34 10.89	11.752	0.33	10 30 05.9	67.76	4.87	5.10
2	10 38 52.55	11.720	0.33	10 02 51.1	68.47	4.87	5.10
3	10 43 33.45	11.689	0.33	9 35 19.6	69.15	4.87	5.10
4	10 48 13.62	11.659	0.33	9 07 32.3	69.79	4.87	5.10
5	10 52 53.09	+11.631	0.33	+ 8 39 29.8	-70.41	4.87	5.10
6	10 57 31.90	11.603	0.33	8 11 12.7	71.00	4.87	5.10
7	11 02 10.06	11.577	0.33	7 42 42.0	71.56	4.87	5.10
8	11 06 47.63	11.554	0.33	7 13 58.2	72.08	4.87	5.10
9	11 11 24.64	11.531	0.33	6 45 02.2	72.58	4.87	5.10
10	11 16 01.11	+11.509	0.33	+ 6 15 54.6	-73.05	4.87	5.10
11	11 20 37.09	11.489	0.33	5 46 36.2	73.48	4.87	5.10
12	11 25 12.60	11.471	0.33	5 17 07.8	73.88	4.87	5.10
13	11 29 47.69	11.454	0.33	4 47 30.1	74.25	4.87	5.10
14	11 34 22.39	11.438	0.33	4 17 43.9	74.59	4.87	5.10
15	11 38 56.73	+11.424	0.33	+ 3 47 50.0	-74.90	4.88	5.11
16	11 43 30.75	11.412	0.33	3 17 49.0	75.18	4.88	5.11
17	11 48 04.50	11.401	0.33	2 47 41.7	75.43	4.88	5.11
18	11 52 38.02	11.392	0.33	2 17 28.8	75.64	4.88	5.11
19	11 57 11.34	11.385	0.33	1 47 11.1	75.82	4.89	5.12
20	12 01 44.51	+11.379	0.33	+ 1 16 49.4	-75.98	4.89	5.12
21	12 06 17.56	11.375	0.33	0 46 24.3	76.10	4.89	5.12
22	12 10 50.54	11.373	0.33	+ 0 15 56.6	76.20	4.89	5.12
23	12 15 23.49	11.373	0.33	- 0 14 33.1	76.27	4.90	5.13
24	12 19 56.46	11.375	0.33	0 45 03.9	76.30	4.90	5.13
25	12 24 29.50	+11.378	0.33	- 1 15 35.2	-76.30	4.90	5.13
26	12 29 02.63	11.383	0.33	1 46 06.2	76.27	4.91	5.14
27	12 33 35.92	11.391	0.33	2 16 36.1	76.21	4.91	5.14
28	12 38 09.40	11.399	0.33	2 47 04.4	76.13	4.91	5.14
29	12 42 43.11	11.410	0.33	3 17 30.2	76.01	4.92	5.15
30	12 47 17.11	+11.423	0.33	- 3 47 52.8	-75.86	4.92	5.15
Oct. 1	12 51 51.43	+11.437	0.33	- 4 18 11.4	-75.68	4.92	5.15

VENUS, 1931. AT TRANSIT AT GREENWICH.

Date.	Apparent Right Ascension.	Var. per Hour of Long.	Sidereal Time of S. D. passing Meridian.	Apparent Declination.	Var. per Hour of Long.	Semi- diameter.	Hori- zontal Parallax.
Oct. 1	^h 12 ^m 51 ^s 51.43	+11.437	0.33	— 4 18 11.4	—75.68	4.92	5.15
2	12 56 26.12	11.454	0.33	4 48 25.4	75.48	4.93	5.16
3	13 01 01.22	11.472	0.33	5 18 34.0	75.24	4.93	5.16
4	13 05 36.77	11.491	0.33	5 48 36.4	74.96	4.94	5.17
5	13 10 12.81	11.513	0.33	6 18 31.8	74.65	4.94	5.17
6	13 14 49.40	+11.536	0.33	— 6 48 19.6	—74.32	4.95	5.18
7	13 19 26.56	11.561	0.33	7 17 59.0	73.96	4.95	5.18
8	13 24 04.35	11.588	0.33	7 47 29.2	73.56	4.96	5.19
9	13 28 42.79	11.616	0.33	8 16 49.4	73.12	4.96	5.19
10	13 33 21.93	11.646	0.34	8 45 58.7	72.65	4.97	5.20
11	13 38 01.79	+11.677	0.34	— 9 14 56.5	—72.15	4.97	5.20
12	13 42 42.42	11.709	0.34	9 43 41.8	71.62	4.98	5.21
13	13 47 23.85	11.743	0.34	10 12 14.0	71.06	4.98	5.21
14	13 52 06.11	11.779	0.34	10 40 32.2	70.46	4.99	5.22
15	13 56 49.23	11.815	0.34	11 08 35.6	69.83	4.99	5.22
16	14 01 33.24	+11.853	0.34	—11 36 23.5	—69.16	5.00	5.23
17	14 06 18.19	11.892	0.34	12 03 54.9	68.45	5.01	5.24
18	14 11 04.09	11.933	0.34	12 31 09.0	67.72	5.01	5.24
19	14 15 50.97	11.975	0.34	12 58 05.2	66.96	5.02	5.25
20	14 20 38.88	12.018	0.34	13 24 42.6	66.16	5.03	5.26
21	14 25 27.83	+12.062	0.35	—13 51 00.5	—65.33	5.03	5.26
22	14 30 17.85	12.107	0.35	14 16 58.0	64.46	5.04	5.27
23	14 35 08.97	12.153	0.35	14 42 34.4	63.56	5.05	5.28
24	14 40 01.20	12.200	0.35	15 07 48.8	62.63	5.06	5.29
25	14 44 54.59	12.249	0.35	15 32 40.4	61.67	5.06	5.29
26	14 49 49.14	+12.297	0.35	—15 57 08.5	—60.67	5.07	5.30
27	14 54 44.87	12.347	0.35	16 21 12.2	59.64	5.07	5.31
28	14 59 41.80	12.397	0.35	16 44 50.8	58.58	5.08	5.32
29	15 04 39.95	12.448	0.35	17 08 03.6	57.48	5.08	5.32
30	15 09 39.33	12.500	0.36	17 30 49.6	56.35	5.09	5.33
31	15 14 39.96	+12.552	0.36	—17 53 08.2	—55.19	5.10	5.34
Nov. 1	15 19 41.83	12.604	0.36	18 14 58.4	53.99	5.11	5.35
2	15 24 44.97	12.657	0.36	18 36 19.6	52.77	5.12	5.36
3	15 29 49.36	12.709	0.36	18 57 11.0	51.51	5.13	5.37
4	15 34 55.01	12.762	0.36	19 17 31.9	50.22	5.14	5.38
5	15 40 01.92	+12.814	0.36	—19 37 21.3	—48.89	5.14	5.38
6	15 45 10.08	12.866	0.37	19 56 38.6	47.54	5.15	5.39
7	15 50 19.50	12.918	0.37	20 15 23.0	46.15	5.16	5.40
8	15 55 30.14	12.969	0.37	20 33 33.7	44.74	5.17	5.41
9	16 00 42.00	13.020	0.37	20 51 10.1	43.29	5.18	5.42
10	16 05 55.07	+13.069	0.37	—21 08 11.4	—41.81	5.19	5.43
11	16 11 09.30	13.117	0.37	21 24 36.8	40.30	5.20	5.44
12	16 16 24.69	13.165	0.37	21 40 25.7	38.77	5.21	5.45
13	16 21 41.19	13.210	0.38	21 55 37.5	37.21	5.22	5.46
14	16 26 58.78	13.255	0.38	22 10 11.4	35.61	5.23	5.47
15	16 32 17.43	+13.298	0.38	—22 24 06.8	—34.00	5.24	5.48
16	16 37 37.09	+13.340	0.38	—22 37 23.1	—32.36	5.26	5.50

AT TRANSIT AT GREENWICH.

Date.	Apparent Right Ascension.	Var. per Hour of Long.	Sidereal Time of S. D. passing Meridian.	Apparent Declination.	Var. per Hour of Long.	Semi- diameter.	Hori- zontal Parallax.
Nov. 16	^h 16 ^m 37 ^s 37.09	+13.340	0.38	[°] 22 ['] 37 ["] 23.1	-32.36	5.26	5.50
17	16 42 57.74	13.380	0.38	22 49 59.8	30.69	5.27	5.51
18	16 48 19.32	13.418	0.38	23 01 56.2	29.01	5.28	5.52
19	16 53 41.81	13.455	0.38	23 13 11.9	27.30	5.28	5.53
20	16 59 05.16	13.490	0.38	23 23 46.2	25.56	5.29	5.54
21	17 04 29.30	+13.522	0.39	-23 33 38.8	-23.82	5.30	5.55
22	17 09 54.20	13.553	0.39	23 42 49.2	22.05	5.31	5.56
23	17 15 19.81	13.581	0.39	23 51 16.9	20.26	5.33	5.58
24	17 20 46.07	13.607	0.39	23 59 01.6	18.46	5.34	5.59
25	17 26 12.93	13.631	0.39	24 06 02.9	16.64	5.35	5.60
26	17 31 40.32	+13.652	0.39	-24 12 20.4	-14.81	5.36	5.61
27	17 37 08.20	13.671	0.39	24 17 53.9	12.97	5.38	5.63
28	17 42 36.50	13.687	0.39	24 22 42.9	11.12	5.39	5.64
29	17 48 05.16	13.701	0.40	24 26 47.4	9.25	5.40	5.65
30	17 53 34.11	13.712	0.40	24 30 07.0	7.38	5.41	5.66
Dec. 1	17 59 03.30	+13.720	0.40	-24 32 41.6	-5.50	5.43	5.68
2	18 04 32.65	13.726	0.40	24 34 31.1	3.62	5.44	5.69
3	18 10 02.11	13.729	0.40	24 35 35.3	-1.73	5.45	5.70
4	18 15 31.60	13.729	0.40	24 35 54.1	+0.16	5.47	5.72
5	18 21 01.06	13.726	0.40	24 35 27.6	2.05	5.48	5.73
6	18 26 30.42	+13.720	0.40	-24 34 15.6	+3.95	5.50	5.75
7	18 31 59.60	13.711	0.40	24 32 18.2	5.83	5.51	5.76
8	18 37 28.55	13.700	0.40	24 29 35.6	7.72	5.52	5.78
9	18 42 57.18	13.685	0.40	24 26 07.7	9.60	5.53	5.79
10	18 48 25.42	13.668	0.41	24 21 54.8	11.47	5.55	5.81
11	18 53 53.21	+13.648	0.41	-24 16 57.0	+13.34	5.56	5.82
12	18 59 20.48	13.625	0.41	24 11 14.5	15.20	5.58	5.84
13	19 04 47.17	13.599	0.41	24 04 47.6	17.04	5.59	5.85
14	19 10 13.20	13.570	0.41	23 57 36.6	18.87	5.61	5.87
15	19 15 38.52	13.539	0.41	23 49 41.8	20.69	5.62	5.88
16	19 21 03.06	+13.506	0.41	-23 41 03.5	+22.49	5.64	5.90
17	19 26 26.77	13.470	0.41	23 31 42.2	24.28	5.66	5.92
18	19 31 49.60	13.432	0.41	23 21 38.3	26.05	5.67	5.93
19	19 37 11.48	13.391	0.41	23 10 52.1	27.80	5.69	5.95
20	19 42 32.37	13.350	0.41	22 59 24.2	29.53	5.71	5.97
21	19 47 52.22	+13.305	0.41	-22 47 15.1	+31.23	5.72	5.99
22	19 53 10.99	13.259	0.41	22 34 25.3	32.91	5.73	6.00
23	19 58 28.64	13.211	0.41	22 20 55.4	34.58	5.75	6.02
24	20 03 45.13	13.162	0.42	22 06 45.8	36.21	5.77	6.04
25	20 09 00.42	13.112	0.42	21 51 57.3	37.83	5.79	6.06
26	20 14 14.48	+13.060	0.42	-21 36 30.3	+39.41	5.81	6.08
27	20 19 27.28	13.007	0.42	21 20 25.6	40.97	5.83	6.10
28	20 24 38.81	12.953	0.42	21 03 43.7	42.51	5.84	6.11
29	20 29 49.03	12.898	0.42	20 46 25.3	44.02	5.86	6.13
30	20 34 57.93	12.843	0.42	20 28 31.1	45.50	5.88	6.15
31	20 40 05.49	+12.787	0.42	-20 10 01.7	+46.95	5.90	6.17
32	20 45 11.69	+12.730	0.42	-19 50 57.9	+48.37	5.92	6.20

MARS, 1931.

AT TRANSIT AT GREENWICH.

Date.	Apparent Right Ascension.	Var. per Hour of Long.	Sidereal Time of S. D. passing Meridian.	Apparent Declination.	Var. per Hour of Long.	Semi- diameter.	Hori- zontal Parallax.
Jan. 1	^h 09 ^m 16 ^s 53.56	^s - 1.725	^s 0.46	[°] +19 47 25.5	["] +14.11	["] 6.45	["] 12.13
2	09 16 10.52	1.862	0.46	19 53 10.3	14.61	6.49	12.21
3	09 15 24.20	1.998	0.46	19 59 06.8	15.09	6.53	12.29
4	09 14 34.61	2.134	0.47	20 05 14.5	15.55	6.57	12.37
5	09 13 41.79	2.268	0.47	20 11 32.9	15.98	6.61	12.44
6	09 12 45.76	- 2.401	0.47	+20 18 01.4	+16.39	6.65	12.52
7	09 11 46.58	2.531	0.48	20 24 39.4	16.77	6.69	12.59
8	09 10 44.29	2.659	0.48	20 31 26.3	17.13	6.73	12.65
9	09 09 38.95	2.785	0.48	20 38 21.4	17.46	6.76	12.71
10	09 08 30.61	2.909	0.48	20 45 23.9	17.74	6.79	12.77
11	09 07 19.36	- 3.028	0.49	+20 52 32.9	+18.00	6.83	12.83
12	09 06 05.29	3.144	0.49	20 59 47.8	18.23	6.86	12.89
13	09 04 48.48	3.256	0.49	21 07 07.5	18.41	6.89	12.95
14	09 03 29.03	3.363	0.49	21 14 31.2	18.56	6.91	13.00
15	09 02 07.10	3.464	0.50	21 21 57.9	18.66	6.93	13.04
16	09 00 42.79	- 3.560	0.50	+21 29 26.6	+18.72	6.96	13.09
17	08 59 16.25	3.650	0.50	21 36 56.3	18.75	6.98	13.13
18	08 57 47.63	3.734	0.50	21 44 26.1	18.73	7.00	13.16
19	08 56 17.08	3.811	0.50	21 51 54.9	18.66	7.02	13.19
20	08 54 44.77	3.880	0.51	21 59 21.6	18.55	7.03	13.22
21	08 53 10.88	- 3.943	0.51	+22 06 45.1	+18.40	7.04	13.24
22	08 51 35.59	3.998	0.51	22 14 04.6	18.21	7.05	13.26
23	08 49 59.07	4.045	0.51	22 21 19.0	17.98	7.06	13.27
24	08 48 21.52	4.083	0.51	22 28 27.2	17.70	7.06	13.28
25	08 46 43.14	4.114	0.51	22 35 28.4	17.39	7.07	13.29
26	08 45 04.11	- 4.137	0.51	+22 42 21.7	+17.04	7.07	13.29
27	08 43 24.65	4.151	0.51	22 49 06.2	16.66	7.07	13.29
28	08 41 44.94	4.157	0.51	22 55 41.0	16.24	7.06	13.28
29	08 40 05.19	4.154	0.51	23 02 05.4	15.79	7.05	13.26
30	08 38 25.60	4.144	0.51	23 08 18.8	15.32	7.04	13.24
30	08 36 46.35	- 4.125	0.51	+23 14 20.4	+14.82	7.03	13.22
31	08 35 07.65	4.099	0.51	23 20 09.7	14.29	7.02	13.20
Feb. 1	08 33 29.67	4.065	0.51	23 25 46.2	13.75	7.01	13.17
2	08 31 52.60	4.023	0.51	23 31 09.4	13.18	6.99	13.13
3	08 30 16.61	3.974	0.51	23 36 18.9	12.61	6.96	13.09
4	08 28 41.89	- 3.918	0.51	+23 41 14.4	+12.02	6.94	13.05
5	08 27 08.59	3.855	0.50	23 45 55.5	11.41	6.91	13.00
6	08 25 36.90	3.785	0.50	23 50 22.0	10.80	6.89	12.95
7	08 24 06.96	3.709	0.50	23 54 33.7	10.18	6.86	12.90
8	08 22 38.92	3.626	0.50	23 58 30.6	9.56	6.83	12.84
9	08 21 12.96	- 3.536	0.50	+24 02 12.4	+ 8.93	6.80	12.78
10	08 19 49.21	3.441	0.49	24 05 39.1	8.30	6.76	12.71
11	08 18 27.81	3.341	0.49	24 08 50.7	7.67	6.73	12.65
12	08 17 08.89	3.235	0.49	24 11 47.1	7.03	6.69	12.58
13	08 15 52.59	3.123	0.49	24 14 28.4	6.41	6.65	12.50
14	08 14 39.01	- 3.008	0.48	+24 16 54.8	+ 5.79	6.61	12.43
15	08 13 28.26	- 2.888	0.48	+24 19 06.4	+ 5.18	6.57	12.35

AT TRANSIT AT GREENWICH.

Date.	Apparent Right Ascension.	Var. per Hour of Long.	Sidereal Time of S. D. passing Meridian.	Apparent Declination.	Var. per Hour of Long.	Semi- diameter.	Horiz- ontal Parallax.
Feb. 16	^h 08 ^m 12 ^s 20.44	- 2.764	^s 0.48	[°] +24 ['] 21 ["] 03.3	+ 4.57	6.53	12.27
17	08 11 15.62	2.637	0.47	24 22 45.7	3.97	6.48	12.20
18	08 10 13.91	2.506	0.47	24 24 13.8	3.37	6.44	12.12
19	08 09 15.35	2.373	0.47	24 25 27.8	2.79	6.39	12.03
20	08 08 20.02	2.238	0.46	24 26 28.0	2.22	6.35	11.94
21	08 07 27.96	- 2.101	0.46	+24 27 14.6	+ 1.66	6.30	11.85
22	08 06 39.20	1.962	0.46	24 27 48.0	1.12	6.25	11.76
23	08 05 53.79	1.822	0.45	24 28 08.5	0.59	6.20	11.67
24	08 05 11.73	1.682	0.45	24 28 16.4	+ 0.07	6.16	11.58
25	08 04 33.06	1.541	0.45	24 28 11.9	- 0.44	6.11	11.49
26	08 03 57.77	- 1.400	0.44	+24 27 55.4	- 0.93	6.06	11.40
27	08 03 25.86	1.259	0.44	24 27 27.3	1.41	6.01	11.30
28	08 02 57.33	1.119	0.44	24 26 47.7	1.88	5.96	11.21
Mar. 1	08 02 32.15	0.979	0.43	24 25 57.0	2.34	5.92	11.12
2	08 02 10.31	0.841	0.43	24 24 55.6	2.78	5.87	11.02
3	08 01 51.78	- 0.704	0.43	+24 23 43.8	- 3.20	5.82	10.93
4	08 01 36.53	0.568	0.42	24 22 21.9	3.62	5.77	10.84
5	08 01 24.52	0.433	0.42	24 20 50.1	4.03	5.72	10.74
6	08 01 15.73	0.300	0.42	24 19 08.7	4.42	5.67	10.65
7	08 01 10.12	0.168	0.41	24 17 18.0	4.80	5.62	10.55
8	08 01 07.66	- 0.038	0.41	+24 15 18.2	- 5.18	5.57	10.46
9	08 01 08.31	+ 0.091	0.40	24 13 09.4	5.55	5.52	10.37
10	08 01 12.03	0.219	0.40	24 10 52.0	5.91	5.47	10.28
11	08 01 18.79	0.344	0.40	24 08 26.0	6.26	5.42	10.19
12	08 01 28.55	0.469	0.39	24 05 51.7	6.60	5.37	10.09
13	08 01 41.27	+ 0.591	0.39	+24 03 09.3	- 6.94	5.32	10.00
14	08 01 56.90	0.711	0.38	24 00 18.8	7.27	5.27	9.91
15	08 02 15.40	0.830	0.38	23 57 20.5	7.59	5.23	9.83
16	08 02 36.72	0.947	0.38	23 54 14.4	7.91	5.19	9.74
17	08 03 00.82	1.061	0.37	23 51 00.7	8.23	5.14	9.65
18	08 03 27.64	+ 1.174	0.37	+23 47 39.4	- 8.54	5.09	9.56
19	08 03 57.14	1.284	0.37	23 44 10.7	8.85	5.05	9.48
20	08 04 29.26	1.393	0.36	23 40 34.7	9.15	5.00	9.39
21	08 05 03.96	1.499	0.36	23 36 51.4	9.45	4.96	9.31
22	08 05 41.17	1.602	0.36	23 33 01.1	9.74	4.91	9.23
23	08 06 20.85	+ 1.704	0.35	+23 29 03.7	- 10.04	4.87	9.15
24	08 07 02.94	1.803	0.35	23 24 59.3	10.33	4.83	9.07
25	08 07 47.39	1.900	0.35	23 20 47.9	10.61	4.78	8.99
26	08 08 34.14	1.995	0.34	23 16 29.8	10.90	4.74	8.91
27	08 09 23.13	2.087	0.34	23 12 04.9	11.18	4.70	8.83
28	08 10 14.31	+ 2.177	0.34	+23 07 33.2	- 11.46	4.66	8.75
29	08 11 07.62	2.265	0.33	23 02 54.9	11.73	4.62	8.68
30	08 12 03.00	2.350	0.33	22 58 10.0	12.01	4.58	8.60
31	08 13 00.39	2.433	0.33	22 53 18.6	12.28	4.54	8.53
Apr. 1	08 13 59.75	2.514	0.33	22 48 20.7	12.55	4.50	8.45
2	08 15 01.02	+ 2.592	0.32	+22 43 16.3	- 12.82	4.46	8.38
3	08 16 04.15	+ 2.669	0.32	+22 38 05.5	- 13.08	4.42	8.31

MARS, 1931.

AT TRANSIT AT GREENWICH.

Date.	Apparent Right Ascension.	Var. per Hour of Long.	Sidereal Time of S. D. passing Meridian.	Apparent Declination.	Var. per Hour of Long.	Semi- diameter.	Hori- zontal Parallax.
Apr. 4	^h 08 ^m 17 ^s 09.10	+ 2.743	0.32	+22 32 48.3	-13.35	4.39	8.24
5	08 18 15.81	2.816	0.31	22 27 24.7	13.62	4.35	8.17
6	08 19 24.25	2.887	0.31	22 21 54.7	13.88	4.31	8.10
7	08 20 34.37	2.956	0.31	22 16 18.4	14.15	4.28	8.04
8	08 21 46.13	3.024	0.31	22 10 35.7	14.41	4.24	7.97
9	08 22 59.51	+ 3.090	0.30	+22 04 46.6	-14.68	4.21	7.91
10	08 24 14.45	3.155	0.30	21 58 51.1	14.94	4.18	7.84
11	08 25 30.93	3.218	0.30	21 52 49.3	15.21	4.14	7.78
12	08 26 48.90	3.279	0.30	21 46 41.0	15.48	4.11	7.72
13	08 28 08.33	3.340	0.29	21 40 26.3	15.75	4.08	7.66
14	08 29 29.19	+ 3.398	0.29	+21 34 05.1	-16.02	4.05	7.60
15	08 30 51.43	3.455	0.29	21 27 37.5	16.29	4.02	7.54
16	08 32 15.02	3.511	0.29	21 21 03.4	16.56	3.99	7.48
17	08 33 39.94	3.565	0.28	21 14 22.8	16.83	3.96	7.42
18	08 35 06.13	3.618	0.28	21 07 35.7	17.10	3.92	7.36
19	08 36 33.57	+ 3.669	0.28	+21 00 42.1	-17.37	3.89	7.31
20	08 38 02.23	3.719	0.28	20 53 42.0	17.64	3.86	7.25
21	08 39 32.06	3.767	0.27	20 46 35.5	17.91	3.83	7.20
22	08 41 03.04	3.814	0.27	20 39 22.5	18.18	3.81	7.14
23	08 42 35.13	3.860	0.27	20 32 02.9	18.45	3.78	7.09
24	08 44 08.30	+ 3.904	0.27	+20 24 36.9	-18.72	3.75	7.04
25	08 45 42.51	3.947	0.26	20 17 04.4	18.99	3.72	6.99
26	08 47 17.74	3.988	0.26	20 09 25.5	19.26	3.69	6.94
27	08 48 53.94	4.028	0.26	20 01 40.1	19.52	3.67	6.89
28	08 50 31.09	4.067	0.26	19 53 48.3	19.79	3.64	6.84
29	08 52 09.16	+ 4.105	0.26	+19 45 50.2	-20.05	3.62	6.79
30	08 53 48.11	4.141	0.25	19 37 45.7	20.32	3.59	6.74
May 1	08 55 27.93	4.177	0.25	19 29 34.9	20.58	3.56	6.70
2	08 57 08.58	4.211	0.25	19 21 17.8	20.84	3.54	6.65
3	08 58 50.04	4.244	0.25	19 12 54.4	21.11	3.51	6.61
4	09 00 32.30	+ 4.277	0.25	+19 04 24.6	-21.37	3.49	6.56
5	09 02 15.33	4.308	0.24	18 55 48.5	21.64	3.47	6.52
6	09 03 59.10	4.339	0.24	18 47 06.0	21.90	3.45	6.48
7	09 05 43.61	4.369	0.24	18 38 17.3	22.16	3.42	6.43
8	09 07 28.83	4.399	0.24	18 29 22.2	22.43	3.39	6.39
9	09 09 14.75	+ 4.428	0.24	+18 20 20.9	-22.69	3.37	6.35
10	09 11 01.36	4.456	0.24	18 11 13.2	22.95	3.35	6.31
11	09 12 48.62	4.483	0.23	18 01 59.2	23.21	3.33	6.27
12	09 14 36.54	4.510	0.23	17 52 38.9	23.48	3.31	6.23
13	09 16 25.08	4.536	0.23	17 43 12.2	23.74	3.29	6.19
14	09 18 14.25	+ 4.561	0.23	+17 33 39.3	-24.00	3.27	6.15
15	09 20 04.01	4.586	0.23	17 24 00.0	24.27	3.25	6.11
16	09 21 54.36	4.610	0.23	17 14 14.5	24.53	3.23	6.08
17	09 23 45.28	4.634	0.22	17 04 22.7	24.79	3.22	6.04
18	09 25 36.76	4.656	0.22	16 54 24.7	25.05	3.20	6.01
19	09 27 28.76	+ 4.678	0.22	+16 44 20.5	-25.30	3.18	5.97
20	09 29 21.29	4.700	0.22	+16 34 10.1	-25.56	3.16	5.93

AT TRANSIT AT GREENWICH.

Date.	Apparent Right Ascension.	Var. per Hour of Long.	Sidereal Time of S. D. passing Meridian.	Apparent Declination.	Var. per Hour of Long.	Semi- diameter.	Hori- zontal Parallax.
May 21	^h ^m ^s 09 31 14.33	^s + 4.720	^s 0.22	[°] ['] ["] +16 23 53.6	["] -25.82	["] 3.14	["] 5.90
22	09 33 07.85	4.740	0.22	16 13 30.9	26.07	3.12	5.87
23	09 35 01.85	4.759	0.22	16 03 02.2	26.32	3.10	5.83
24	09 36 56.30	4.778	0.21	15 52 27.5	26.57	3.08	5.80
25	09 38 51.20	4.797	0.21	15 41 46.8	26.82	3.07	5.77
26	09 40 46.53	+ 4.814	0.21	+15 31 00.2	-27.06	3.05	5.74
27	09 42 42.27	4.831	0.21	15 20 07.8	27.30	3.04	5.70
28	09 44 38.41	4.847	0.21	15 09 09.6	27.55	3.02	5.67
29	09 46 34.93	4.863	0.21	14 58 05.6	27.79	3.00	5.64
30	09 48 31.84	4.879	0.21	14 46 55.8	28.02	2.99	5.61
31	09 50 29.10	+ 4.894	0.20	+14 35 40.5	-28.26	2.97	5.58
June 1	09 52 26.73	4.909	0.20	14 24 19.5	28.49	2.95	5.55
2	09 54 24.71	4.923	0.20	14 12 52.9	28.73	2.93	5.53
3	09 56 23.03	4.937	0.20	14 01 20.7	28.96	2.92	5.50
4	09 58 21.70	4.952	0.20	13 49 43.0	29.19	2.91	5.47
5	10 00 20.70	+ 4.965	0.20	+13 37 59.8	-29.41	2.89	5.44
6	10 02 20.02	4.979	0.20	13 26 11.1	29.64	2.88	5.41
7	10 04 19.67	4.992	0.20	13 14 16.9	29.87	2.86	5.39
8	10 06 19.64	5.005	0.19	13 02 17.3	30.09	2.85	5.36
9	10 08 19.92	5.018	0.19	12 50 12.4	30.32	2.84	5.34
10	10 10 20.51	+ 5.031	0.19	+12 38 02.1	-30.54	2.83	5.31
11	10 12 21.40	5.043	0.19	12 25 46.5	30.76	2.81	5.28
12	10 14 22.59	5.056	0.19	12 13 25.7	30.98	2.80	5.26
13	10 16 24.08	5.068	0.19	12 00 59.6	31.19	2.79	5.23
14	10 18 25.86	5.080	0.19	11 48 28.4	31.41	2.77	5.21
15	10 20 27.93	+ 5.092	0.19	+11 35 52.0	-31.62	2.76	5.19
16	10 22 30.28	5.104	0.19	11 23 10.5	31.83	2.75	5.16
17	10 24 32.91	5.115	0.19	11 10 24.0	32.04	2.73	5.14
18	10 26 35.80	5.126	0.18	10 57 32.5	32.25	2.72	5.12
19	10 28 38.95	5.137	0.18	10 44 36.1	32.45	2.71	5.09
20	10 30 42.37	+ 5.148	0.18	+10 31 34.9	-32.65	2.69	5.07
21	10 32 46.04	5.158	0.18	10 18 28.9	32.85	2.68	5.05
22	10 34 49.95	5.168	0.18	10 05 18.3	33.04	2.67	5.03
23	10 36 54.11	5.178	0.18	9 52 03.1	33.23	2.66	5.01
24	10 38 58.50	5.188	0.18	9 38 43.4	33.41	2.65	4.99
25	10 41 03.12	+ 5.197	0.18	+ 9 25 19.3	-33.60	2.64	4.97
26	10 43 07.97	5.207	0.18	9 11 50.8	33.78	2.63	4.95
27	10 45 13.05	5.216	0.18	8 58 18.1	33.95	2.62	4.93
28	10 47 18.35	5.226	0.18	8 44 41.1	34.13	2.61	4.91
29	10 49 23.88	5.235	0.18	8 30 59.9	34.30	2.60	4.89
30	10 51 29.63	+ 5.244	0.17	+ 8 17 14.6	-34.47	2.59	4.87
July 1	10 53 35.60	5.253	0.17	8 03 25.3	34.64	2.58	4.85
2	10 55 41.79	5.263	0.17	7 49 32.0	34.80	2.56	4.83
3	10 57 48.21	5.272	0.17	7 35 34.7	34.97	2.55	4.81
4	10 59 54.86	5.282	0.17	7 21 33.5	35.13	2.54	4.79
5	11 02 01.73	+ 5.291	0.17	+ 7 07 28.5	-35.29	2.54	4.77
6	11 04 08.84	+ 5.301	0.17	+ 6 53 19.7	-35.44	2.53	4.76

JUPITER, 1931.

AT TRANSIT AT GREENWICH.

Date.	Apparent Right Ascension.	Var. per Hour of Long.	Sidereal Time of Eq'l. S.D. passing Meridian.	Apparent Declination.	Var. per Hour of Long.	Polar Semi- diameter.	Hori- zontal Parallax.
Jan.	^h 07 ^m 10 ^s 31.45	— ^s 1.429	^s 1.69	+22° 36' 31.3"	+ 2.76	21.81	2.09
	07 09 57.08	1.435	1.69	22 37 37.5	2.75	21.81	2.09
	07 09 22.58	1.440	1.69	22 38 43.4	2.74	21.82	2.09
	07 08 47.98	1.443	1.69	22 39 49.0	2.72	21.82	2.09
	07 08 13.31	1.446	1.69	22 40 54.2	2.71	21.82	2.09
	07 07 38.59	— 1.447	1.69	+22 41 58.9	+ 2.69	21.82	2.09
	07 07 03.84	1.448	1.69	22 43 03.2	2.67	21.82	2.09
	07 06 29.09	1.448	1.69	22 44 06.9	2.64	21.82	2.09
	07 05 54.36	1.446	1.69	22 45 10.0	2.62	21.82	2.09
	07 05 19.68	1.444	1.69	22 46 12.6	2.59	21.81	2.09
	07 04 45.08	— 1.440	1.69	+22 47 14.5	+ 2.56	21.80	2.09
	07 04 10.59	1.435	1.69	22 48 15.7	2.53	21.79	2.09
	07 03 36.23	1.429	1.69	22 49 16.1	2.50	21.78	2.08
	07 03 02.02	1.422	1.69	22 50 15.8	2.47	21.77	2.08
	07 02 27.99	1.414	1.68	22 51 14.7	2.44	21.75	2.08
	07 01 54.17	— 1.404	1.68	+22 52 12.8	+ 2.40	21.74	2.08
	07 01 20.59	1.394	1.68	22 53 10.0	2.36	21.72	2.08
	07 00 47.27	1.383	1.68	22 54 06.3	2.33	21.70	2.08
	07 00 14.23	1.370	1.68	22 55 01.7	2.29	21.68	2.08
	06 59 41.51	1.356	1.68	22 55 56.1	2.25	21.66	2.07
	06 59 09.14	— 1.341	1.68	+22 56 49.6	+ 2.21	21.63	2.07
	06 58 37.13	1.326	1.68	22 57 42.2	2.17	21.61	2.07
	06 58 05.51	1.309	1.67	22 58 33.8	2.13	21.58	2.07
	06 57 34.30	1.291	1.67	22 59 24.3	2.08	21.55	2.06
	06 57 03.53	1.273	1.67	23 00 13.7	2.04	21.52	2.06
	06 56 33.21	— 1.254	1.67	+23 01 02.1	+ 1.99	21.49	2.06
	06 56 03.37	1.233	1.66	23 01 49.4	1.95	21.46	2.05
	06 55 34.04	1.211	1.66	23 02 35.6	1.90	21.43	2.05
	06 55 05.23	1.190	1.66	23 03 20.6	1.85	21.39	2.05
	06 54 36.95	1.167	1.66	23 04 04.6	1.81	21.36	2.04
	06 54 09.23	— 1.143	1.66	+23 04 47.5	+ 1.76	21.32	2.04
	06 53 42.09	1.119	1.65	23 05 29.2	1.72	21.28	2.04
Feb.	06 53 15.54	1.094	1.65	23 06 09.9	1.67	21.24	2.03
	06 52 49.59	1.068	1.65	23 06 49.4	1.62	21.20	2.03
	06 52 24.27	1.042	1.64	23 07 27.8	1.57	21.16	2.03
	06 51 59.59	— 1.015	1.64	+23 08 05.0	+ 1.53	21.11	2.02
	06 51 35.56	0.987	1.64	23 08 41.1	1.48	21.07	2.02
	06 51 12.20	0.959	1.63	23 09 16.1	1.44	21.02	2.01
	06 50 49.52	0.931	1.63	23 09 50.0	1.39	20.98	2.01
	06 50 27.54	0.901	1.63	23 10 22.8	1.34	20.93	2.00
	06 50 06.27	— 0.871	1.62	+23 10 54.4	+ 1.30	20.88	2.00
	06 49 45.73	0.841	1.62	23 11 25.0	1.25	20.83	1.99
	06 49 25.92	0.810	1.61	23 11 54.4	1.20	20.79	1.99
	06 49 06.86	0.778	1.61	23 12 22.7	1.16	20.74	1.98
	06 48 48.56	0.746	1.61	23 12 49.9	1.11	20.69	1.98
	06 48 31.04	— 0.714	1.60	+23 13 16.7	+ 1.07	20.64	1.97
	06 48 14.30	— 0.681	1.60	+23 13 41.2	+ 1.02	20.59	1.97

JUPITER, 1931.

AT TRANSIT AT GREENWICH.

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Date.	Apparent Right Ascension.	Var. per Hour of Long.	Sidereal Time of Eq'l. S.D. passing Meridian.	Apparent Declination.	Var. per Hour of Long.	Polar Semi- diameter.	Horiz- ontal Parallax.
	^h ^m ^s	^s	^s	[°] ['] ["]	["]	["]	["]
Feb. 15	06 48 14.30	- 0.681	1.60	+23 13 41.2	+ 1.02	20.59	1.97
16	06 47 58.35	0.648	1.60	23 14 05.1	0.97	20.53	1.96
17	06 47 43.20	0.614	1.59	23 14 28.0	0.93	20.48	1.96
18	06 47 28.86	0.580	1.59	23 14 49.8	0.89	20.42	1.95
19	06 47 15.34	0.546	1.58	23 15 10.5	0.84	20.37	1.95
20	06 47 02.65	- 0.512	1.58	+23 15 30.2	+ 0.80	20.31	1.94
21	06 46 50.78	0.477	1.57	23 15 48.8	0.75	20.25	1.94
22	06 46 39.76	0.442	1.57	23 16 06.3	0.71	20.20	1.93
23	06 46 29.57	0.407	1.57	23 16 22.8	0.67	20.14	1.93
24	06 46 20.23	0.371	1.56	23 16 38.3	0.62	20.08	1.92
25	06 46 11.74	- 0.336	1.56	+23 16 52.7	+ 0.58	20.02	1.92
26	06 46 04.09	0.301	1.55	23 17 06.1	0.54	19.96	1.91
27	06 45 57.29	0.266	1.55	23 17 18.4	0.49	19.91	1.90
28	06 45 51.34	0.230	1.54	23 17 29.8	0.45	19.85	1.90
Mar. 1	06 45 46.25	0.194	1.54	23 17 40.2	0.41	19.79	1.89
2	06 45 42.01	- 0.159	1.53	+23 17 49.5	+ 0.37	19.73	1.89
3	06 45 38.61	0.124	1.53	23 17 57.9	0.33	19.67	1.88
4	06 45 36.07	0.088	1.52	23 18 05.2	0.29	19.61	1.88
5	06 45 34.37	0.053	1.52	23 18 11.6	0.25	19.55	1.87
6	06 45 33.52	- 0.018	1.52	23 18 17.0	0.20	19.49	1.86
7	06 45 33.52	+ 0.018	1.51	+23 18 21.4	+ 0.16	19.43	1.86
8	06 45 34.37	0.053	1.51	23 18 24.9	0.12	19.37	1.85
9	06 45 36.06	0.088	1.50	23 18 27.4	0.08	19.30	1.85
10	06 45 38.60	0.123	1.50	23 18 28.9	+ 0.04	19.24	1.84
11	06 45 41.98	0.158	1.49	23 18 29.5	0.00	19.18	1.84
12	06 45 46.20	+ 0.193	1.49	+23 18 29.1	- 0.04	19.12	1.83
13	06 45 51.25	0.228	1.48	23 18 27.8	0.08	19.06	1.82
14	06 45 57.14	0.263	1.48	23 18 25.5	0.12	19.00	1.82
15	06 46 03.86	0.297	1.47	23 18 22.2	0.16	18.94	1.82
16	06 46 11.41	0.332	1.47	23 18 17.9	0.20	18.88	1.81
17	06 46 19.78	+ 0.366	1.46	+23 18 12.6	- 0.24	18.82	1.80
18	06 46 28.98	0.400	1.46	23 18 06.4	0.28	18.76	1.80
19	06 46 38.99	0.434	1.45	23 17 59.2	0.32	18.70	1.79
20	06 46 49.81	0.468	1.45	23 17 51.0	0.36	18.64	1.78
21	06 47 01.44	0.501	1.44	23 17 41.9	0.40	18.58	1.78
22	06 47 13.87	+ 0.535	1.44	+23 17 31.7	- 0.45	18.52	1.77
23	06 47 27.10	0.568	1.44	23 17 20.5	0.49	18.46	1.77
24	06 47 41.11	0.600	1.43	23 17 08.4	0.53	18.40	1.76
25	06 47 55.90	0.632	1.43	23 16 55.2	0.57	18.34	1.76
26	06 48 11.46	0.664	1.42	23 16 41.0	0.61	18.28	1.75
27	06 48 27.79	+ 0.696	1.42	+23 16 25.8	- 0.65	18.23	1.74
28	06 48 44.88	0.728	1.41	23 16 09.6	0.70	18.17	1.74
29	06 49 02.71	0.759	1.41	23 15 52.4	0.74	18.11	1.73
30	06 49 21.29	0.789	1.40	23 15 34.1	0.79	18.05	1.73
31	06 49 40.60	0.820	1.40	23 15 14.7	0.83	17.99	1.72
Apr. 1	06 50 00.64	+ 0.850	1.39	+23 14 54.3	- 0.87	17.94	1.72
2	06 50 21.40	+ 0.880	1.39	+23 14 32.9	- 0.91	17.88	1.71

JUPITER, 1931.

AT TRANSIT AT GREENWICH.

Date.	Apparent Right Ascension.	Var. per Hour of Long.	Sidereal Time of Eq'l. S.D. passing Meridian.	Apparent Declination.	Var. per Hour of Long.	Polar Semi- diameter.	Hori- zontal Parallax.
Apr. 1	^h 06 ^m 50 ^s 00.64	+ 0.850	1.39	+23 14 54.3	- 0.87	17.94	1.72
2	06 50 21.40	0.880	1.39	23 14 32.9	0.91	17.88	1.71
3	06 50 42.86	0.909	1.39	23 14 10.5	0.96	17.83	1.71
4	06 51 05.02	0.938	1.38	23 13 47.0	1.00	17.77	1.70
5	06 51 27.88	0.967	1.38	23 13 22.5	1.04	17.72	1.70
6	06 51 51.43	+ 0.996	1.37	+23 12 56.9	- 1.09	17.66	1.69
7	06 52 15.67	1.024	1.37	23 12 30.2	1.14	17.61	1.68
8	06 52 40.58	1.052	1.36	23 12 02.4	1.18	17.56	1.68
9	06 53 06.15	1.079	1.36	23 11 33.4	1.23	17.51	1.67
10	06 53 32.38	1.107	1.36	23 11 03.4	1.27	17.45	1.67
11	06 53 59.27	+ 1.134	1.35	+23 10 32.2	- 1.32	17.40	1.66
12	06 54 26.80	1.160	1.35	23 09 59.9	1.37	17.35	1.66
13	06 54 54.97	1.187	1.34	23 09 26.5	1.42	17.29	1.65
14	06 55 23.78	1.213	1.34	23 08 51.9	1.46	17.24	1.65
15	06 55 53.21	1.239	1.33	23 08 16.2	1.51	17.19	1.64
16	06 56 23.25	+ 1.264	1.33	+23 07 39.2	- 1.56	17.14	1.64
17	06 56 53.90	1.290	1.33	23 07 01.1	1.61	17.09	1.64
18	06 57 25.15	1.314	1.32	23 06 21.7	1.66	17.04	1.63
19	06 57 56.99	1.339	1.32	23 05 41.2	1.71	16.99	1.63
20	06 58 29.42	1.363	1.32	23 04 59.4	1.77	16.94	1.62
21	06 59 02.42	+ 1.387	1.31	+23 04 16.3	- 1.82	16.89	1.62
22	06 59 35.99	1.410	1.31	23 03 32.1	1.87	16.85	1.61
23	07 00 10.11	1.433	1.30	23 02 46.6	1.92	16.80	1.61
24	07 00 44.77	1.455	1.30	23 01 59.8	1.97	16.75	1.60
25	07 01 19.97	1.478	1.30	23 01 11.8	2.03	16.71	1.60
26	07 01 55.70	+ 1.500	1.29	+23 00 22.5	- 2.08	16.66	1.59
27	07 02 31.95	1.521	1.29	22 59 31.8	2.14	16.62	1.59
28	07 03 08.71	1.542	1.29	22 58 39.9	2.19	16.58	1.59
29	07 03 45.97	1.563	1.28	22 57 46.7	2.24	16.53	1.58
30	07 04 23.73	1.584	1.28	22 56 52.2	2.30	16.49	1.58
May 1	07 05 01.98	+ 1.604	1.27	+22 55 56.4	- 2.35	16.44	1.57
2	07 05 40.70	1.623	1.27	22 54 59.3	2.41	16.40	1.57
3	07 06 19.89	1.643	1.27	22 54 00.8	2.46	16.36	1.57
4	07 06 59.55	1.662	1.27	22 53 01.0	2.52	16.32	1.56
5	07 07 39.66	1.680	1.26	22 51 59.8	2.58	16.28	1.56
6	07 08 20.21	+ 1.699	1.26	+22 50 57.3	- 2.63	16.24	1.55
7	07 09 01.21	1.718	1.25	22 49 53.4	2.69	16.20	1.55
8	07 09 42.65	1.736	1.25	22 48 48.2	2.75	16.16	1.55
9	07 10 24.52	1.753	1.25	22 47 41.5	2.81	16.12	1.54
10	07 11 06.81	+ 1.771	1.25	+22 46 33.5	- 2.87	16.08	1.54

JUPITER, 1931. AT TRANSIT AT GREENWICH.

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Date.	Apparent Right Ascension.	Var. per Hour of Long.	Sidereal Time of Eq'l. S.D. passing Meridian.	Apparent Declination.	Var. per Hour of Long.	Polar Semi- diameter.	Hori- zontal Parallax.
	^h ^m ^s	^s	^s	[°] ['] [″]	[″]		
Oct. 12	09 21 07.75	+ 1.550	1.20	+16 05 58.8	- 6.73	16.08	1.54
13	09 21 44.69	1.530	1.20	16 03 18.3	6.65	16.12	1.54
14	09 22 21.17	1.510	1.20	16 00 39.6	6.57	16.16	1.55
15	09 22 57.19	1.491	1.20	15 58 02.7	6.50	16.20	1.55
16	09 23 32.73	1.471	1.21	15 55 27.7	6.42	16.24	1.55
17	09 24 07.80	+ 1.451	1.21	+15 52 54.7	- 6.34	16.28	1.56
18	09 24 42.39	1.431	1.21	15 50 23.5	6.26	16.32	1.56
19	09 25 16.49	1.410	1.21	15 47 54.4	6.17	16.36	1.57
20	09 25 50.09	1.390	1.22	15 45 27.4	6.08	16.40	1.57
21	09 26 23.19	1.369	1.22	15 43 02.4	5.99	16.44	1.57
22	09 26 55.79	+ 1.348	1.22	+15 40 39.6	- 5.90	16.49	1.58
23	09 27 27.88	1.326	1.22	15 38 19.0	5.81	16.53	1.58
24	09 27 59.44	1.304	1.23	15 36 00.5	5.72	16.57	1.59
25	09 28 30.49	1.282	1.23	15 33 44.3	5.62	16.62	1.59
26	09 29 01.00	1.260	1.24	15 31 30.5	5.52	16.67	1.59
27	09 29 30.98	+ 1.238	1.24	+15 29 19.1	- 5.42	16.71	1.60
28	09 30 00.41	1.215	1.24	15 27 10.1	5.32	16.76	1.60
29	09 30 29.29	1.192	1.24	15 25 03.5	5.22	16.80	1.61
30	09 30 57.62	1.169	1.25	15 22 59.4	5.12	16.84	1.61
31	09 31 25.38	1.145	1.25	15 20 57.8	5.01	16.89	1.62
Nov. 1	09 31 52.57	+ 1.121	1.25	+15 18 58.9	- 4.90	16.94	1.62
2	09 32 19.19	1.097	1.26	15 17 02.6	4.79	16.99	1.63
3	09 32 45.23	1.072	1.26	15 15 09.0	4.67	17.03	1.63
4	09 33 10.67	1.047	1.26	15 13 18.2	4.56	17.08	1.63
5	09 33 35.51	1.022	1.27	15 11 30.2	4.44	17.13	1.64
6	09 33 59.75	+ 0.997	1.27	+15 09 45.0	- 4.32	17.18	1.64
7	09 34 23.37	0.971	1.27	15 08 02.8	4.20	17.23	1.65
8	09 34 46.37	0.945	1.28	15 06 23.5	4.07	17.28	1.65
9	09 35 08.74	0.919	1.28	15 04 47.2	3.95	17.33	1.66
10	09 35 30.48	0.892	1.28	15 03 13.9	3.82	17.39	1.66
11	09 35 51.57	+ 0.865	1.29	+15 01 43.8	- 3.69	17.44	1.67
12	09 36 12.02	0.838	1.29	15 00 16.8	3.56	17.49	1.67
13	09 36 31.81	0.811	1.30	14 58 53.1	3.42	17.54	1.68
14	09 36 50.95	0.784	1.30	14 57 32.5	3.29	17.60	1.68
15	09 37 09.42	+ 0.756	1.30	+14 56 15.2	- 3.15	17.65	1.69

JUPITER, 1931.

AT TRANSIT AT GREENWICH.

Date.	Apparent Right Ascension.	Var. per Hour of Long.	Sidereal Time of Eq'l. S.D. passing Meridian.	Apparent Declination.	Var. per Hour of Long.	Polar Semi- diameter.	Hori- zontal Parallax.
Nov. 16	^h 09 ^m 37 ^s 27.22	+ 0.727	^s 1.31	+14 55 01.1	- 3.01	17.70	1.69
17	09 37 44.34	0.699	1.31	14 53 50.4	2.87	17.76	1.70
18	09 38 00.79	0.671	1.32	14 52 43.1	2.73	17.81	1.70
19	09 38 16.55	0.643	1.32	14 51 39.2	2.59	17.86	1.71
20	09 38 31.63	0.614	1.32	14 50 38.6	2.45	17.91	1.71
21	09 38 46.00	+ 0.584	1.33	+14 49 41.6	- 2.30	17.97	1.72
22	09 38 59.68	0.555	1.33	14 48 48.0	2.16	18.02	1.72
23	09 39 12.66	0.526	1.33	14 47 57.9	2.01	18.08	1.73
24	09 39 24.93	0.496	1.34	14 47 11.4	1.86	18.13	1.73
25	09 39 36.48	0.466	1.34	14 46 28.5	1.71	18.19	1.74
26	09 39 47.32	+ 0.436	1.35	+14 45 49.2	- 1.56	18.25	1.75
27	09 39 57.44	0.406	1.35	14 45 13.5	1.41	18.30	1.75
28	09 40 06.83	0.376	1.35	14 44 41.4	1.26	18.36	1.76
29	09 40 15.49	0.345	1.36	14 44 13.0	1.11	18.41	1.76
30	09 40 23.41	0.315	1.36	14 43 48.3	0.95	18.47	1.77
Dec. 1	09 40 30.60	+ 0.284	1.37	+14 43 27.3	- 0.79	18.53	1.77
2	09 40 37.04	0.253	1.37	14 43 10.2	0.63	18.58	1.78
3	09 40 42.72	0.221	1.38	14 42 56.9	0.48	18.64	1.78
4	09 40 47.66	0.190	1.38	14 42 47.3	0.32	18.70	1.79
5	09 40 51.84	0.158	1.38	14 42 41.6	- 0.16	18.75	1.79
6	09 40 55.25	+ 0.126	1.39	+14 42 39.7	0.00	18.81	1.80
7	09 40 57.90	0.095	1.39	14 42 41.7	+ 0.16	18.87	1.81
8	09 40 59.79	0.063	1.40	14 42 47.5	0.32	18.92	1.81
9	09 41 00.91	+ 0.031	1.40	14 42 57.2	0.49	18.98	1.82
10	09 41 01.26	- 0.001	1.40	14 43 10.8	0.65	19.04	1.82
11	09 41 00.84	- 0.034	1.41	+14 43 28.3	+ 0.81	19.09	1.83
12	09 40 59.65	0.066	1.41	14 43 49.7	0.97	19.15	1.83
13	09 40 57.69	0.098	1.42	14 44 15.0	1.13	19.20	1.84
14	09 40 54.96	0.130	1.42	14 44 44.1	1.29	19.26	1.84
15	09 40 51.47	0.161	1.43	14 45 17.0	1.45	19.32	1.85
16	09 40 47.21	- 0.193	1.43	+14 45 53.8	+ 1.61	19.37	1.85
17	09 40 42.19	0.225	1.43	14 46 34.4	1.77	19.42	1.86
18	09 40 36.41	0.257	1.44	14 47 18.8	1.93	19.48	1.86
19	09 40 29.87	0.288	1.44	14 48 06.9	2.08	19.53	1.87
20	09 40 22.58	0.320	1.45	14 48 58.7	2.24	19.59	1.87
21	09 40 14.53	- 0.351	1.45	+14 49 54.3	+ 2.39	19.64	1.88
22	09 40 05.73	0.382	1.46	14 50 53.5	2.54	19.69	1.88
23	09 39 56.19	0.413	1.46	14 51 56.3	2.69	19.74	1.89
24	09 39 45.91	0.444	1.46	14 53 02.8	2.85	19.80	1.89
25	09 39 34.89	0.474	1.47	14 54 12.9	3.00	19.85	1.90
26	09 39 23.14	- 0.505	1.47	+14 55 26.6	+ 3.14	19.90	1.90
27	09 39 10.66	0.535	1.47	14 56 43.8	3.29	19.95	1.91
28	09 38 57.46	0.565	1.48	14 58 04.4	3.43	20.00	1.91
29	09 38 43.55	0.595	1.48	14 59 28.5	3.57	20.05	1.92
30	09 38 28.92	0.624	1.49	15 00 56.0	3.71	20.10	1.92
31	09 38 13.60	- 0.653	1.49	+15 02 26.7	+ 3.85	20.15	1.93
32	09 37 57.57	- 0.682	1.49	+15 04 00.8	+ 3.99	20.19	1.93

SATURN, 1931.

AT TRANSIT AT GREENWICH.

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Date.	Apparent Right Ascension.	Var. per Hour of Long.	Sidereal Time of Eq'l. S.D. passing Meridian.	Apparent Declination.	Var. per Hour of Long.	Polar Semi- diameter.	Hori- zontal Parallax.
Mar. 18	19 33 07.57	+ 0.747	0.57	-21 26 38.6	+ 1.53	7.16	0.84
19	19 33 25.34	0.733	0.57	21 26 02.1	1.51	7.17	0.85
20	19 33 42.77	0.719	0.58	21 25 26.3	1.48	7.19	0.85
21	19 33 59.87	0.705	0.58	21 24 51.1	1.45	7.20	0.85
22	19 34 16.62	0.691	0.58	21 24 16.5	1.43	7.21	0.85
23	19 34 33.03	+ 0.676	0.58	-21 23.42.5	+ 1.40	7.22	0.85
24	19 34 49.09	0.662	0.58	21 23 09.3	1.37	7.23	0.85
25	19 35 04.80	0.647	0.58	21 22 36.8	1.34	7.24	0.85
26	19 35 20.16	0.632	0.58	21 22 05.0	1.31	7.25	0.85
27	19 35 35.16	0.618	0.58	21 21 33.9	1.28	7.26	0.86
28	19 35 49.81	+ 0.603	0.58	-21 21 03.5	+ 1.25	7.27	0.86
29	19 36 04.09	0.587	0.58	21 20 33.9	1.22	7.29	0.86
30	19 36 18.01	0.572	0.58	21 20 05.1	1.19	7.30	0.86
31	19 36 31.57	0.557	0.58	21 19 37.0	1.15	7.31	0.86
Apr. 1	19 36 44.76	0.542	0.59	21 19 09.7	1.12	7.32	0.86
2	19 36 57.58	+ 0.526	0.59	-21 18 43.2	+ 1.09	7.33	0.86
3	19 37 10.02	0.511	0.59	21 18 17.6	1.05	7.34	0.87
4	19 37 22.10	0.495	0.59	21 17 52.7	1.02	7.36	0.87
5	19 37 33.79	0.479	0.59	21 17 28.6	0.99	7.37	0.87
6	19 37 45.11	0.464	0.59	21 17 05.4	0.95	7.38	0.87
7	19 37 56.04	+ 0.448	0.59	-21 16 43.0	+ 0.91	7.39	0.87
8	19 38 06.59	0.431	0.59	21 16 21.5	0.88	7.41	0.87
9	19 38 16.75	0.415	0.59	21 16 00.9	0.84	7.42	0.87
10	19 38 26.52	0.399	0.59	21 15 41.1	0.80	7.43	0.88
11	19 38 35.90	0.382	0.59	21 15 22.3	0.77	7.44	0.88
12	19 38 44.88	+ 0.366	0.60	-21 15 04.3	+ 0.73	7.45	0.88
13	19 38 53.46	0.349	0.60	21 14 47.3	0.69	7.47	0.88
14	19 39 01.64	0.333	0.60	21 14 31.2	0.65	7.48	0.88
15	19 39 09.43	0.316	0.60	21 14 16.0	0.61	7.49	0.88
16	19 39 16.81	0.299	0.60	21 14 01.7	0.57	7.50	0.88
17	19 39 23.78	+ 0.282	0.60	-21 13 48.4	+ 0.53	7.52	0.89
18	19 39 30.34	0.265	0.60	21 13 36.1	0.49	7.53	0.89
19	19 39 36.50	0.248	0.60	21 13 24.7	0.45	7.54	0.89
20	19 39 42.24	0.231	0.60	21 13 14.3	0.41	7.55	0.89
21	19 39 47.58	0.214	0.60	21 13 04.9	0.37	7.57	0.89
22	19 39 52.51	+ 0.197	0.61	-21 12 56.4	+ 0.33	7.58	0.89
23	19 39 57.03	0.180	0.61	21 12 49.0	0.29	7.59	0.89
24	19 40 01.13	0.162	0.61	21 12 42.6	0.25	7.60	0.90
25	19 40 04.83	0.145	0.61	21 12 37.2	0.21	7.62	0.90
26	19 40 08.11	0.128	0.61	21 12 32.7	0.16	7.63	0.90
27	19 40 10.98	+ 0.111	0.61	-21 12 29.3	+ 0.12	7.64	0.90
28	19 40 13.43	0.094	0.61	21 12 26.9	0.08	7.65	0.90
29	19 40 15.48	0.077	0.61	21 12 25.4	+ 0.04	7.67	0.90
30	19 40 17.11	0.060	0.61	21 12 24.9	0.00	7.68	0.90
May 1	19 40 18.34	0.042	0.61	21 12 25.5	- 0.04	7.69	0.91
2	19 40 19.15	+ 0.025	0.62	-21 12 27.0	- 0.09	7.71	0.91
3	19 40 19.55	+ 0.008	0.62	21 12 29.6	0.13	7.72	0.91
4	19 40 19.55	- 0.009	0.62	-21 12 33.2	- 0.17	7.73	0.91

SATURN, 1931.

AT TRANSIT AT GREENWICH.

Date.	Apparent Right Ascension.	Var. per Hour of Long.	Sidereal Time of Eq'l. S.D. passing Meridian.	Apparent Declination.	Var. per Hour of Long.	Polar Semi- diameter.	Hori- zontal Parallax.
May 5	^h 19 ^m 40 ^s 19.14	— 0.026	^s 0.62	[°] 21 ['] 12 ["] 37.7	— 0.21	7.74	0.91
6	19 40 18.31	0.043	0.62	21 12 43.3	0.25	7.76	0.92
7	19 40 17.07	0.060	0.62	21 12 49.8	0.29	7.77	0.92
8	19 40 15.42	0.077	0.62	21 12 57.4	0.34	7.78	0.92
9	19 40 13.37	0.094	0.62	21 13 06.0	0.38	7.79	0.92
10	19 40 10.91	— 0.111	0.62	— 21 13 15.5	— 0.42	7.81	0.92
11	19 40 08.04	0.128	0.62	21 13 26.0	0.46	7.82	0.92
12	19 40 04.77	0.145	0.63	21 13 37.5	0.50	7.83	0.92
13	19 40 01.10	0.161	0.63	21 13 49.9	0.54	7.84	0.92
14	19 39 57.02	0.178	0.63	21 14 03.4	0.58	7.85	0.93
15	19 39 52.54	— 0.195	0.63	— 21 14 17.8	— 0.62	7.87	0.93
16	19 39 47.67	0.211	0.63	21 14 33.2	0.66	7.88	0.93
17	19 39 42.40	0.228	0.63	21 14 49.6	0.70	7.89	0.93
18	19 39 36.73	0.244	0.63	21 15 06.9	0.74	7.90	0.93
19	19 39 30.68	0.260	0.63	21 15 25.1	0.78	7.91	0.93
20	19 39 24.24	— 0.276	0.63	— 21 15 44.3	— 0.82	7.93	0.93
21	19 39 17.41	0.292	0.63	21 16 04.4	0.86	7.94	0.94
22	19 39 10.21	0.308	0.64	21 16 25.4	0.89	7.95	0.94
23	19 39 02.63	0.324	0.64	21 16 47.3	0.93	7.96	0.94
24	19 38 54.67	0.339	0.64	21 17 10.1	0.97	7.97	0.94
25	19 38 46.35	— 0.354	0.64	— 21 17 33.8	— 1.00	7.98	0.94
26	19 38 37.66	0.370	0.64	21 17 58.3	1.04	7.99	0.94
27	19 38 28.61	0.385	0.64	21 18 23.6	1.07	8.00	0.94
28	19 38 19.20	0.399	0.64	21 18 49.8	1.11	8.01	0.95
29	19 38 09.45	0.414	0.64	21 19 16.8	1.14	8.02	0.95
30	19 37 59.35	— 0.428	0.64	— 21 19 44.6	— 1.17	8.03	0.95
June 1	19 37 48.91	0.442	0.64	21 20 13.2	1.21	8.05	0.95
2	19 37 38.14	0.456	0.65	21 20 42.5	1.24	8.06	0.95
3	19 37 27.04	0.470	0.65	21 21 12.6	1.27	8.07	0.95
4	19 37 15.60	0.483	0.65	21 21 43.5	1.30	8.07	0.95
5	19 37 03.84	— 0.497	0.65	— 21 22 15.0	— 1.33	8.08	0.95
6	19 36 51.76	0.510	0.65	21 22 47.3	1.36	8.09	0.95
7	19 36 39.37	0.523	0.65	21 23 20.3	1.39	8.10	0.96
8	19 36 26.66	0.536	0.65	21 23 54.0	1.42	8.11	0.96
9	19 36 13.65	0.548	0.65	21 24 28.3	1.44	8.12	0.96
10	19 36 00.34	— 0.560	0.65	— 21 25 03.2	— 1.47	8.13	0.96
11	19 35 46.75	0.572	0.65	21 25 38.7	1.49	8.14	0.96
12	19 35 32.87	0.584	0.65	21 26 14.9	1.52	8.15	0.96
13	19 35 18.71	0.596	0.65	21 26 51.7	1.54	8.15	0.96
14	19 35 04.27	0.607	0.65	21 27 29.0	1.57	8.16	0.96
15	19 34 49.57	— 0.618	0.65	— 21 28 06.9	— 1.59	8.17	0.96
16	19 34 34.62	0.628	0.66	21 28 45.2	1.61	8.18	0.96
17	19 34 19.42	0.639	0.66	21 29 24.1	1.63	8.18	0.96
18	19 34 03.97	0.649	0.66	21 30 03.5	1.65	8.19	0.96
19	19 33 48.28	0.658	0.66	21 30 43.4	1.67	8.20	0.97
20	19 33 32.37	— 0.667	0.66	— 21 31 23.7	— 1.69	8.20	0.97
21	19 33 16.24	0.676	0.66	21 32 04.4	1.70	8.21	0.97
22	19 32 59.90	— 0.685	0.66	— 21 32 45.5	— 1.72	8.22	0.97

SATURN, 1931.
AT TRANSIT AT GREENWICH.

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Date.	Apparent Right Ascension.	Var. per Hour of Long.	Sidereal Time of Eq'l. S.D. passing Meridian.	Apparent Declination.	Var. per Hour of Long.	Polar Semi- diameter.	Hori- zontal Parallax.
June 22	^{h m s} 19 32 43.35	^s - 0.694	^s 0.66	^{° ' "} -21 33 27.0	["] - 1.74	8.22	0.97
23	19 32 26.61	0.701	0.66	21 34 08.8	1.75	8.23	0.97
24	19 32 09.69	0.709	0.66	21 34 50.9	1.76	8.23	0.97
25	19 31 52.59	0.716	0.66	21 35 33.4	1.77	8.24	0.97
26	19 31 35.32	0.723	0.66	21 36 16.1	1.79	8.24	0.97
27	19 31 17.90	- 0.729	0.66	-21 36 59.1	- 1.80	8.25	0.97
28	19 31 00.32	0.735	0.66	21 37 42.4	1.81	8.25	0.97
29	19 30 42.60	0.741	0.66	21 38 25.8	1.81	8.26	0.97
30	19 30 24.75	0.746	0.66	21 39 09.4	1.82	8.26	0.97
July 1	19 30 06.77	0.752	0.66	21 39 53.1	1.82	8.26	0.97
2	19 29 48.67	- 0.756	0.66	-21 40 37.0	- 1.83	8.27	0.97
3	19 29 30.46	0.761	0.66	21 41 21.0	1.84	8.27	0.97
4	19 29 12.14	0.765	0.66	21 42 05.2	1.84	8.27	0.98
5	19 28 53.74	0.769	0.66	21 42 49.5	1.85	8.27	0.98
6	19 28 35.25	0.772	0.66	21 43 33.8	1.85	8.28	0.98
7	19 28 16.69	- 0.775	0.66	-21 44 18.1	- 1.85	8.28	0.98
8	19 27 58.06	0.778	0.66	21 45 02.5	1.85	8.28	0.98
9	19 27 39.37	0.780	0.66	21 45 46.9	1.85	8.28	0.98
10	19 27 20.64	0.781	0.66	21 46 31.3	1.85	8.28	0.98
11	19 27 01.87	0.783	0.66	21 47 15.6	1.85	8.28	0.98
12	19 26 43.07	- 0.784	0.66	-21 47 59.9	- 1.84	8.28	0.98
13	19 26 24.25	0.784	0.66	21 48 44.0	1.84	8.28	0.98
14	19 26 05.42	0.784	0.66	21 49 28.0	1.83	8.28	0.98
14	19 25 46.60	0.784	0.66	21 50 12.0	1.83	8.28	0.98
15	19 25 27.79	0.783	0.66	21 50 55.8	1.82	8.28	0.98
16	19 25 09.00	- 0.782	0.66	-21 51 39.4	- 1.81	8.28	0.98
17	19 24 50.24	0.781	0.66	21 52 22.8	1.81	8.28	0.98
18	19 24 31.53	0.779	0.66	21 53 06.1	1.80	8.28	0.98
19	19 24 12.87	0.776	0.66	21 53 49.2	1.79	8.28	0.98
20	19 23 54.27	0.774	0.67	21 54 31.9	1.77	8.28	0.98
21	19 23 35.74	- 0.770	0.67	-21 55 14.4	- 1.76	8.27	0.98
22	19 23 17.30	0.767	0.67	21 55 56.6	1.75	8.27	0.98
23	19 22 58.94	0.763	0.67	21 56 38.5	1.74	8.27	0.97
24	19 22 40.69	0.758	0.67	21 57 20.1	1.73	8.27	0.97
25	19 22 22.54	0.754	0.66	21 58 01.4	1.71	8.26	0.97
26	19 22 04.51	- 0.749	0.66	-21 58 42.3	- 1.70	8.26	0.97
27	19 21 46.61	0.743	0.66	21 59 22.9	1.68	8.26	0.97
28	19 21 28.84	0.737	0.66	22 00 03.1	1.66	8.25	0.97
29	19 21 11.21	0.731	0.66	22 00 42.8	1.65	8.25	0.97
30	19 20 53.73	0.725	0.66	22 01 22.1	1.63	8.24	0.97
31	19 20 36.40	- 0.718	0.66	-22 02 01.1	- 1.61	8.24	0.97
Aug. 1	19 20 19.25	0.711	0.66	22 02 39.6	1.59	8.23	0.97
2	19 20 02.28	0.703	0.66	22 03 17.6	1.57	8.23	0.97
3	19 19 45.49	0.696	0.66	22 03 55.2	1.56	8.22	0.97
4	19 19 28.89	0.688	0.66	22 04 32.3	1.54	8.22	0.97
5	19 19 12.49	- 0.679	0.66	-22 05 08.9	- 1.52	8.21	0.97
6	19 18 56.30	0.670	0.66	22 05 45.1	1.50	8.20	0.97
7	19 18 40.33	- 0.661	0.66	-22 06 20.7	- 1.47	8.20	0.97

AT TRANSIT AT GREENWICH.

Date.	Apparent Right Ascension.	Var. per Hour of Long.	Sidereal Time of Eq'l. S.D. passing Meridian.	Apparent Declination.	Var. per Hour of Long.	Polar Semi- diameter.	Hori- zontal Parallax.
Aug. 8	^h 19 ^m 18 ^s 24.58	- 0.651	^s 0.66	[°] 22 ['] 06 ["] 55.8	- 1.45	8.19	0.96
9	19 18 09.07	0.641	0.66	22 07 30.4	1.43	8.18	0.96
10	19 17 53.80	0.631	0.66	22 08 04.5	1.41	8.18	0.96
11	19 17 38.78	0.621	0.66	22 08 38.0	1.38	8.17	0.96
12	19 17 24.01	0.610	0.66	22 09 10.9	1.36	8.16	0.96
13	19 17 09.52	- 0.598	0.66	-22 09 43.3	- 1.34	8.15	0.96
14	19 16 55.29	0.587	0.66	22 10 15.0	1.31	8.15	0.96
15	19 16 41.35	0.575	0.66	22 10 46.2	1.29	8.14	0.96
16	19 16 27.70	0.563	0.65	22 11 16.8	1.26	8.13	0.96
17	19 16 14.34	0.550	0.65	22 11 46.7	1.23	8.12	0.96
18	19 16 01.28	- 0.538	0.65	-22 12 16.0	- 1.21	8.11	0.96
19	19 15 48.53	0.525	0.65	22 12 44.7	1.18	8.10	0.96
20	19 15 36.10	0.511	0.65	22 13 12.8	1.16	8.09	0.95
21	19 15 23.98	0.498	0.65	22 13 40.2	1.13	8.08	0.95
22	19 15 12.19	0.484	0.65	22 14 07.0	1.10	8.07	0.95
23	19 15 00.73	- 0.470	0.65	-22 14 33.1	- 1.07	8.06	0.95
24	19 14 49.61	0.456	0.65	22 14 58.6	1.05	8.05	0.95
25	19 14 38.83	0.442	0.65	22 15 23.4	1.02	8.04	0.95
26	19 14 28.39	0.428	0.65	22 15 47.5	0.99	8.03	0.95
27	19 14 18.30	0.413	0.65	22 16 10.9	0.96	8.02	0.95
28	19 14 08.56	- 0.398	0.65	-22 16 33.7	- 0.94	8.01	0.95
29	19 13 59.18	0.383	0.64	22 16 55.8	0.91	8.00	0.94
30	19 13 50.17	0.368	0.64	22 17 17.2	0.88	7.99	0.94
31	19 13 41.52	0.353	0.64	22 17 37.9	0.85	7.98	0.94
Sept. 1	19 13 33.24	0.337	0.64	22 17 57.9	0.82	7.97	0.94
2	19 13 25.34	- 0.321	0.64	-22 18 17.2	- 0.79	7.96	0.94
3	19 13 17.82	0.305	0.64	22 18 35.8	0.76	7.95	0.94
4	19 13 10.68	0.289	0.64	22 18 53.7	0.73	7.94	0.94
5	19 13 03.93	0.273	0.64	22 19 11.0	0.70	7.93	0.93
6	19 12 57.57	0.257	0.64	22 19 27.5	0.67	7.91	0.93
7	19 12 51.60	- 0.240	0.64	-22 19 43.3	- 0.64	7.90	0.93
8	19 12 46.03	0.224	0.64	22 19 58.4	0.61	7.89	0.93
9	19 12 40.86	0.207	0.64	22 20 12.8	0.59	7.88	0.93
10	19 12 36.10	0.190	0.63	22 20 26.5	0.55	7.87	0.93
11	19 12 31.74	0.173	0.63	22 20 39.4	0.52	7.85	0.93
12	19 12 27.79	- 0.156	0.63	-22 20 51.6	- 0.49	7.84	0.92
13	19 12 24.26	0.138	0.63	22 21 03.0	0.46	7.83	0.92
14	19 12 21.15	0.121	0.63	22 21 13.8	0.43	7.82	0.92
15	19 12 18.45	0.104	0.63	22 21 23.8	0.40	7.81	0.92
16	19 12 16.17	0.086	0.63	22 21 33.1	0.37	7.79	0.92
17	19 12 14.30	- 0.069	0.63	-22 21 41.6	- 0.34	7.78	0.92
18	19 12 12.86	0.051	0.63	22 21 49.3	0.31	7.77	0.92
19	19 12 11.83	0.034	0.63	22 21 56.3	0.28	7.76	0.92
20	19 12 11.23	- 0.016	0.62	22 22 02.6	0.25	7.74	0.91
21	19 12 11.05	+ 0.001	0.62	22 22 08.1	0.21	7.73	0.91
22	19 12 11.29	+ 0.019	0.62	-22 22 12.9	- 0.18	7.72	0.91
23	19 12 11.96	0.036	0.62	22 22 16.9	0.15	7.71	0.91
24	19 12 13.04	+ 0.054	0.62	-22 22 20.2	- 0.12	7.69	0.91

AT TRANSIT AT GREENWICH.

Date.	Apparent Right Ascension.	Var. per Hour of Long.	Sidereal Time of Eq'l. S.D. passing Meridian.	Apparent Declination.	Var. per Hour of Long.	Polar Semi- diameter.	Horiz- ontal Parallax.
Sept. 25	^h 19 ^m 12 ^s 14.55	+ 0.072	0.62	— 22 22 22.8	— 0.09	7.68	0.90
26	19 12 16.48	0.089	0.62	22 22 24.6	0.06	7.67	0.90
27	19 12 18.83	0.107	0.62	22 22 25.6	— 0.03	7.66	0.90
28	19 12 21.61	0.125	0.62	22 22 25.9	0.00	7.64	0.90
29	19 12 24.81	0.142	0.62	22 22 25.5	+ 0.03	7.63	0.90
30	19 12 28.42	+ 0.159	0.61	— 22 22 24.3	+ 0.06	7.62	0.90
Oct. 1	19 12 32.46	0.177	0.61	22 22 22.4	0.10	7.60	0.90
2	19 12 36.92	0.194	0.61	22 22 19.7	0.13	7.59	0.89
3	19 12 41.79	0.212	0.61	22 22 16.2	0.16	7.58	0.89
4	19 12 47.09	0.230	0.61	22 22 12.0	0.19	7.57	0.89
5	19 12 52.81	+ 0.247	0.61	— 22 22 07.0	+ 0.22	7.55	0.89
6	19 12 58.94	0.264	0.61	22 22 01.3	0.25	7.54	0.89
7	19 13 05.50	0.282	0.61	22 21 54.9	0.28	7.53	0.89
8	19 13 12.47	0.299	0.61	22 21 47.7	0.32	7.52	0.89
9	19 13 19.85	0.316	0.60	22 21 39.7	0.35	7.50	0.88
10	19 13 27.65	+ 0.333	0.60	— 22 21 31.0	+ 0.38	7.49	0.88
11	19 13 35.85	0.350	0.60	22 21 21.5	0.41	7.48	0.88
12	19 13 44.47	0.368	0.60	22 21 11.2	0.44	7.47	0.88
13	19 13 53.50	0.385	0.60	22 21 00.2	0.47	7.46	0.88
14	19 14 02.94	0.402	0.60	22 20 48.4	0.51	7.44	0.88
15	19 14 12.78	+ 0.419	0.60	— 22 20 35.8	+ 0.54	7.43	0.88
16	19 14 23.03	0.435	0.60	22 20 22.4	0.57	7.42	0.87
17	19 14 33.67	0.452	0.60	22 20 08.3	0.60	7.41	0.87
18	19 14 44.71	0.468	0.60	22 19 53.4	0.64	7.39	0.87
19	19 14 56.14	0.484	0.59	22 19 37.8	0.67	7.38	0.87
20	19 15 07.96	+ 0.501	0.59	— 22 19 21.4	+ 0.70	7.37	0.87
21	19 15 20.17	0.517	0.59	22 19 04.2	0.73	7.36	0.87
22	19 15 32.76	0.532	0.59	22 18 46.2	0.77	7.35	0.87
23	19 15 45.73	0.548	0.59	22 18 27.4	0.80	7.33	0.86
24	19 15 59.08	0.564	0.59	22 18 07.9	0.83	7.32	0.86
25	19 16 12.80	+ 0.579	0.59	— 22 17 47.6	+ 0.86	7.31	0.86
26	19 16 26.89	0.595	0.59	22 17 26.6	0.89	7.30	0.86
27	19 16 41.35	0.610	0.59	22 17 04.8	0.92	7.29	0.86
28	19 16 56.18	0.625	0.59	22 16 42.3	0.95	7.28	0.86
29	19 17 11.36	0.640	0.58	22 16 19.0	0.99	7.26	0.86
30	19 17 26.91	+ 0.655	0.58	— 22 15 54.9	+ 1.02	7.25	0.85
31	19 17 42.81	0.670	0.58	22 15 30.0	1.05	7.24	0.85
Nov. 1	19 17 59.06	0.684	0.58	22 15 04.4	1.08	7.23	0.85
2	19 18 15.66	0.699	0.58	22 14 38.0	1.12	7.22	0.85
3	19 18 32.60	0.713	0.58	22 14 10.8	1.15	7.21	0.85
4	19 18 49.89	+ 0.727	0.58	— 22 13 43.0	+ 1.18	7.20	0.85
5	19 19 07.52	0.742	0.58	22 13 14.3	1.21	7.19	0.85
6	19 19 25.49	0.756	0.58	22 12 44.8	1.25	7.18	0.85
7	19 19 43.79	0.769	0.58	22 12 14.5	1.28	7.17	0.84
8	19 20 02.42	0.783	0.58	22 11 43.5	1.31	7.16	0.84
9	19 20 21.37	+ 0.796	0.58	— 22 11 11.7	+ 1.34	7.15	0.84
10	19 20 40.65	0.810	0.57	22 10 39.2	1.37	7.14	0.84
11	19 21 00.24	+ 0.823	0.57	— 22 10 05.9	+ 1.40	7.13	0.84

URANUS, 1931. AT TRANSIT AT GREENWICH.

Date.	Apparent Right Ascension.	Var. per Hour of Long.	Sidereal Time of S. D. passing Meridian.	Apparent Declination.	Var. per Hour of Long.	Semi- diameter.	Hori- zontal Parallax.
Jan. 1	^h 00 ^m 43 ^s 19.43	+ 0.088	0.11	+ 3 56 09.1	+ 0.66	1.72	0.44
2	00 43 21.63	0.095	0.11	3 56 25.6	0.71	1.72	0.44
3	00 43 24.01	0.103	0.11	3 56 43.3	0.76	1.72	0.44
4	00 43 26.58	0.111	0.11	3 57 02.2	0.81	1.72	0.44
5	00 43 29.34	0.119	0.11	3 57 22.2	0.86	1.71	0.44
6	00 43 32.29	+ 0.127	0.11	+ 3 57 43.5	+ 0.91	1.71	0.44
7	00 43 35.42	0.134	0.11	3 58 05.9	0.96	1.71	0.44
8	00 43 38.74	0.142	0.11	3 58 29.4	1.01	1.71	0.44
9	00 43 42.24	0.150	0.11	3 58 54.2	1.06	1.70	0.44
10	00 43 45.93	0.157	0.11	3 59 20.1	1.10	1.70	0.44
11	00 43 49.79	+ 0.165	0.11	+ 3 59 47.2	+ 1.15	1.70	0.44
12	00 43 53.84	0.173	0.11	4 00 15.4	1.20	1.70	0.44
13	00 43 58.08	0.180	0.11	4 00 44.7	1.25	1.70	0.44
14	00 44 02.49	0.188	0.11	4 01 15.2	1.30	1.70	0.44
15	00 44 07.09	0.195	0.11	4 01 46.9	1.34	1.70	0.44
16	00 44 11.87	+ 0.203	0.11	+ 4 02 19.6	+ 1.39	1.70	0.44
17	00 44 16.83	0.210	0.11	4 02 53.5	1.44	1.69	0.43
18	00 44 21.96	0.217	0.11	4 03 28.5	1.48	1.69	0.43
19	00 44 27.27	0.225	0.11	4 04 04.6	1.53	1.69	0.43
20	00 44 32.75	0.232	0.11	4 04 41.8	1.57	1.69	0.43
21	00 44 38.41	+ 0.239	0.11	+ 4 05 20.1	+ 1.62	1.69	0.43
22	00 44 44.24	0.246	0.11	4 05 59.4	1.66	1.69	0.43
23	00 44 50.24	0.253	0.11	4 06 39.8	1.70	1.69	0.43
24	00 44 56.41	0.260	0.11	4 07 21.2	1.75	1.69	0.43
25	00 45 02.74	0.267	0.11	4 08 03.6	1.79	1.68	0.43
26	00 45 09.23	+ 0.274	0.11	+ 4 08 47.1	+ 1.84	1.68	0.43
27	00 45 15.89	0.281	0.11	4 09 31.7	1.88	1.68	0.43
28	00 45 22.72	0.288	0.11	4 10 17.2	1.92	1.68	0.43
29	00 45 29.70	0.294	0.11	4 11 03.7	1.96	1.68	0.43
30	00 45 36.84	0.301	0.11	4 11 51.3	2.00	1.68	0.43
31	00 45 44.14	+ 0.307	0.11	+ 4 12 39.7	+ 2.04	1.68	0.43
Feb. 1	00 45 51.59	+ 0.314	0.11	+ 4 13 29.1	+ 2.08	1.68	0.43

URANUS, 1931.

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AT TRANSIT AT GREENWICH.

Date.	Apparent Right Ascension.	Var. per Hour of Long.	Sidereal Time of S. D. passing Meridian.	Apparent Declination.	Var. per Hour of Long.	Semi- diameter.	Hori- zontal Parallax.
Aug. 25	^{h m s} 01 11 13.81	— 0.212	0.12	+ 6 49 58.2	— 1.34	1.77	0.46
26	01 11 08.65	0.218	0.12	6 49 25.4	1.38	1.77	0.46
27	01 11 03.34	0.224	0.12	6 48 51.8	1.42	1.78	0.46
28	01 10 57.89	0.230	0.12	6 48 17.2	1.46	1.78	0.46
29	01 10 52.29	0.236	0.12	6 47 41.8	1.49	1.78	0.46
30	01 10 46.56	— 0.242	0.12	+ 6 47 05.5	— 1.53	1.78	0.46
Sept. 31	01 10 40.68	0.248	0.12	6 46 28.5	1.56	1.78	0.46
1	01 10 34.67	0.253	0.12	6 45 50.6	1.60	1.78	0.46
2	01 10 28.52	0.259	0.12	6 45 11.9	1.63	1.78	0.46
3	01 10 22.24	0.264	0.12	6 44 32.5	1.66	1.78	0.46
4	01 10 15.83	— 0.270	0.12	+ 6 43 52.3	— 1.69	1.79	0.46
5	01 10 09.29	0.275	0.12	6 43 11.3	1.72	1.79	0.46
6	01 10 02.62	0.280	0.12	6 42 29.6	1.75	1.79	0.46
7	01 09 55.84	0.285	0.12	6 41 47.2	1.78	1.79	0.46
8	01 09 48.94	0.290	0.12	6 41 04.0	1.81	1.79	0.46
9	01 09 41.92	— 0.295	0.12	+ 6 40 20.1	— 1.84	1.79	0.46
10	01 09 34.78	0.300	0.12	6 39 35.5	1.87	1.79	0.46
11	01 09 27.54	0.304	0.12	6 38 50.3	1.90	1.79	0.46
12	01 09 20.18	0.309	0.12	6 38 04.4	1.92	1.79	0.46
13	01 09 12.72	0.313	0.12	6 37 18.0	1.95	1.79	0.46
14	01 09 05.15	— 0.317	0.12	+ 6 36 30.9	— 1.97	1.79	0.46
15	01 08 57.49	0.321	0.12	6 35 43.3	2.00	1.79	0.46
16	01 08 49.72	0.325	0.12	6 34 55.0	2.02	1.80	0.46
17	01 08 41.87	0.329	0.12	6 34 06.3	2.04	1.80	0.46
18	01 08 33.93	0.333	0.12	6 33 17.1	2.06	1.80	0.46
19	01 08 25.90	— 0.336	0.12	+ 6 32 27.3	— 2.08	1.80	0.46
20	01 08 17.79	0.340	0.12	6 31 37.0	2.10	1.80	0.46
21	01 08 09.60	0.343	0.12	6 30 46.3	2.12	1.80	0.46
22	01 08 01.34	0.346	0.12	6 29 55.2	2.14	1.80	0.46
23	01 07 53.00	0.349	0.12	6 29 03.6	2.16	1.80	0.46
24	01 07 44.60	— 0.351	0.12	+ 6 28 11.6	— 2.17	1.80	0.46
25	01 07 36.13	0.354	0.12	6 27 19.3	2.19	1.80	0.46
26	01 07 27.59	0.357	0.12	6 26 26.6	2.20	1.80	0.46
27	01 07 19.00	0.359	0.12	6 25 33.6	2.21	1.80	0.46
28	01 07 10.35	0.361	0.12	6 24 40.3	2.23	1.80	0.46
29	01 07 01.66	— 0.363	0.12	+ 6 23 46.7	— 2.24	1.80	0.46
30	01 06 52.91	0.365	0.12	6 22 52.8	2.25	1.80	0.46
Oct. 1	01 06 44.12	0.367	0.12	6 21 58.7	2.26	1.80	0.46
2	01 06 35.29	0.369	0.12	6 21 04.3	2.27	1.80	0.46
3	01 06 26.42	— 0.370	0.12	+ 6 20 09.7	— 2.28	1.80	0.46

URANUS, 1931.

AT TRANSIT AT GREENWICH.

Date.	Apparent Right Ascension.	Var. per Hour of Long.	Sidereal Time of S. D. passing Meridian.	Apparent Declination.	Var. per Hour of Long.	Semi- diameter.	Hori- zontal Parallax.
Oct.	1 ^{h m s} 01 06 44.12	- 0.367 ^s	0.12 ^s	+ 6° 21' 58.7"	- 2.26"	1.80"	0.46"
	2 01 06 35.29	0.369	0.12	6 21 04.3	2.27	1.80	0.46
	3 01 06 26.42	0.370	0.12	6 20 09.7	2.28	1.80	0.46
	4 01 06 17.51	0.372	0.12	6 19 14.9	2.29	1.80	0.46
	5 01 06 08.57	0.373	0.12	6 18 20.0	2.29	1.80	0.46
	6 01 05 59.60	- 0.374	0.12	+ 6 17 24.9	- 2.30	1.81	0.46
	7 01 05 50.61	0.375	0.12	6 16 29.7	2.30	1.81	0.46
	8 01 05 41.61	0.375	0.12	6 15 34.4	2.30	1.81	0.46
	8 01 05 32.59	0.376	0.12	6 14 39.1	2.31	1.81	0.46
	9 01 05 23.55	0.377	0.12	6 13 43.7	2.31	1.81	0.46
	10 01 05 14.51	- 0.377	0.12	+ 6 12 48.3	- 2.31	1.81	0.46
	11 01 05 05.46	0.377	0.12	6 11 52.9	2.31	1.81	0.46
	12 01 04 56.41	0.377	0.12	6 10 57.5	2.31	1.81	0.46
	13 01 04 47.37	0.376	0.12	6 10 02.2	2.30	1.81	0.46
	14 01 04 38.34	0.376	0.12	6 09 06.9	2.30	1.81	0.46
	15 01 04 29.33	- 0.375	0.12	+ 6 08 11.8	- 2.29	1.81	0.46
	16 01 04 20.33	0.375	0.12	6 07 16.8	2.29	1.80	0.46
	17 01 04 11.35	0.374	0.12	6 06 22.0	2.28	1.80	0.46
	18 01 04 02.39	0.373	0.12	6 05 27.3	2.27	1.80	0.46
	19 01 03 53.46	0.371	0.12	6 04 32.8	2.26	1.80	0.46
	20 01 03 44.56	- 0.370	0.12	+ 6 03 38.6	- 2.25	1.80	0.46
	21 01 03 35.71	0.368	0.12	6 02 44.7	2.24	1.80	0.46
	22 01 03 26.89	0.366	0.12	6 01 51.0	2.23	1.80	0.46
	23 01 03 18.12	0.365	0.12	6 00 57.7	2.22	1.80	0.46
	24 01 03 09.39	0.363	0.12	6 00 04.6	2.20	1.80	0.46
	25 01 03 00.71	- 0.360	0.12	+ 5 59 11.9	- 2.19	1.80	0.46
	26 01 02 52.09	0.358	0.12	5 58 19.5	2.17	1.80	0.46
	27 01 02 43.52	0.356	0.12	5 57 27.6	2.16	1.80	0.46
	28 01 02 35.01	0.353	0.12	5 56 36.0	2.14	1.80	0.46
	29 01 02 26.57	0.350	0.12	5 55 44.8	2.12	1.80	0.46
	30 01 02 18.20	- 0.347	0.12	+ 5 54 54.0	- 2.10	1.80	0.46
	31 01 02 09.90	0.344	0.12	5 54 03.8	2.08	1.80	0.46
Nov.	1 01 02 01.68	0.341	0.12	5 53 14.0	2.06	1.80	0.46
	2 01 01 53.54	0.337	0.12	5 52 24.8	2.04	1.80	0.46
	3 01 01 45.48	0.334	0.12	5 51 36.1	2.02	1.80	0.46
	4 01 01 37.50	- 0.331	0.12	+ 5 50 48.0	- 1.99	1.80	0.46
	5 01 01 29.61	0.327	0.12	5 50 00.5	1.97	1.80	0.46
	6 01 01 21.81	0.323	0.12	5 49 13.6	1.94	1.80	0.46
	7 01 01 14.12	0.319	0.12	5 48 27.3	1.92	1.80	0.46
	8 01 01 06.52	0.314	0.12	5 47 41.6	1.89	1.80	0.46
	9 01 00 59.03	- 0.310	0.12	+ 5 46 56.6	- 1.86	1.79	0.46
	10 01 00 51.64	0.306	0.12	5 46 12.2	1.83	1.79	0.46
	11 01 00 44.36	0.301	0.12	5 45 28.7	1.80	1.79	0.46
	12 01 00 37.20	0.296	0.12	5 44 45.9	1.77	1.79	0.46
	13 01 00 30.16	0.291	0.12	5 44 03.7	1.74	1.79	0.46
	14 01 00 23.24	- 0.286	0.12	+ 5 43 22.3	- 1.71	1.79	0.46
	15 01 00 16.44	- 0.281	0.12	+ 5 42 41.8	- 1.67	1.79	0.46

AT TRANSIT AT GREENWICH.

Date.	Apparent Right Ascension.	Var. per Hour of Long.	Sidereal Time of S. D. passing Meridian.	Apparent Declination.	Var. per Hour of Long.	Semi- diameter.	Hori- zontal Parallax.
Nov. 16	^h ^m ^s 01 00 09.76	^s - 0.275	^s 0.12	[°] ['] ["] + 5 42 02.1	["] - 1.64	["] 1.79	["] 0.46
17	01 00 03.22	0.270	0.12	5 41 23.2	1.60	1.78	0.46
18	00 59 56.80	0.265	0.12	5 40 45.2	1.57	1.78	0.46
19	00 59 50.52	0.259	0.12	5 40 08.0	1.53	1.78	0.46
20	00 59 44.38	0.253	0.12	5 39 31.7	1.50	1.78	0.46
21	00 59 38.38	- 0.247	0.12	+ 5 38 56.2	- 1.46	1.78	0.46
22	00 59 32.52	0.241	0.12	5 38 21.7	1.42	1.78	0.46
23	00 59 26.81	0.235	0.12	5 37 48.1	1.38	1.78	0.46
24	00 59 21.24	0.229	0.12	5 37 15.5	1.34	1.78	0.46
25	00 59 15.82	0.223	0.12	5 36 43.8	1.30	1.78	0.46
26	00 59 10.55	- 0.216	0.12	+ 5 36 13.1	- 1.26	1.78	0.46
27	00 59 05.44	0.210	0.12	5 35 43.3	1.22	1.78	0.46
28	00 59 00.48	0.203	0.12	5 35 14.5	1.18	1.78	0.46
29	00 58 55.68	0.197	0.12	5 34 46.7	1.14	1.77	0.45
30	00 58 51.03	0.190	0.12	5 34 19.9	1.10	1.77	0.45
Dec. 1	00 58 46.55	- 0.183	0.12	+ 5 33 54.1	- 1.05	1.77	0.45
2	00 58 42.23	0.176	0.12	5 33 29.4	1.01	1.77	0.45
3	00 58 38.08	0.169	0.12	5 33 05.8	0.96	1.77	0.45
4	00 58 34.10	0.162	0.12	5 32 43.2	0.92	1.77	0.45
5	00 58 30.29	0.155	0.12	5 32 21.6	0.88	1.77	0.45
6	00 58 26.65	- 0.148	0.12	+ 5 32 01.1	- 0.83	1.77	0.45
7	00 58 23.18	0.141	0.12	5 31 41.8	0.78	1.76	0.45
8	00 58 19.89	0.133	0.12	5 31 23.6	0.74	1.76	0.45
9	00 58 16.78	0.126	0.12	5 31 06.5	0.69	1.76	0.45
10	00 58 13.85	0.118	0.12	5 30 50.6	0.64	1.76	0.45
11	00 58 11.10	- 0.111	0.12	+ 5 30 35.8	- 0.59	1.75	0.45
12	00 58 08.53	0.103	0.12	5 30 22.1	0.55	1.75	0.45
13	00 58 06.14	0.096	0.12	5 30 09.6	0.50	1.75	0.45
14	00 58 03.93	0.088	0.12	5 29 58.2	0.45	1.75	0.45
15	00 58 01.91	0.080	0.12	5 29 48.0	0.40	1.75	0.45
16	00 58 00.08	- 0.072	0.12	+ 5 29 38.9	- 0.35	1.75	0.45
17	00 57 58.43	0.065	0.12	5 29 31.1	0.30	1.75	0.45
18	00 57 56.97	0.057	0.12	5 29 24.4	0.25	1.75	0.45
19	00 57 55.69	0.049	0.12	5 29 19.0	0.20	1.74	0.45
20	00 57 54.61	0.041	0.12	5 29 14.7	0.15	1.74	0.45
21	00 57 53.72	- 0.033	0.12	+ 5 29 11.6	- 0.11	1.74	0.45
22	00 57 53.01	0.025	0.12	5 29 09.6	0.06	1.74	0.45
23	00 57 52.50	0.017	0.12	5 29 08.8	- 0.01	1.74	0.45
24	00 57 52.17	0.010	0.12	5 29 09.2	+ 0.04	1.74	0.45
25	00 57 52.04	- 0.002	0.12	5 29 10.9	0.09	1.74	0.45
26	00 57 52.09	+ 0.006	0.12	+ 5 29 13.7	+ 0.14	1.74	0.45
27	00 57 52.34	0.014	0.12	5 29 17.7	0.19	1.73	0.44
28	00 57 52.78	0.022	0.12	5 29 22.9	0.24	1.73	0.44
29	00 57 53.41	0.030	0.12	5 29 29.3	0.29	1.73	0.44
30	00 57 54.23	0.038	0.12	5 29 36.9	0.34	1.73	0.44
31	00 57 55.24	+ 0.046	0.12	+ 5 29 45.7	+ 0.39	1.73	0.44
32	00 57 56.44	+ 0.054	0.12	+ 5 29 55.7	+ 0.44	1.73	0.44

NEPTUNE, 1931.

AT TRANSIT AT GREENWICH.

Date.	Apparent Right Ascension.	Var. per Hour of Long.	Sidereal Time of S. D. passing Meridian.	Apparent Declination.	Var. per Hour of Long.	Semi- diameter.	Hori- zontal Parallax
Jan. 14	^h 10 ^m 30 ^s 02.42	- 0.176	0.08	+ 10 11 28.1	+ 1.10	1.24	0.30
15	10 29 58.16	0.180	0.08	10 11 54.8	1.12	1.24	0.30
16	10 29 53.80	0.184	0.08	10 12 22.0	1.15	1.24	0.30
17	10 29 49.35	0.187	0.08	10 12 49.8	1.17	1.24	0.30
18	10 29 44.81	0.191	0.08	10 13 18.0	1.19	1.24	0.30
19	10 29 40.18	- 0.195	0.08	+ 10 13 46.7	+ 1.21	1.24	0.30
20	10 29 35.46	0.198	0.08	10 14 15.9	1.22	1.24	0.30
21	10 29 30.66	0.202	0.08	10 14 45.5	1.24	1.24	0.30
22	10 29 25.77	0.205	0.08	10 15 15.6	1.26	1.24	0.30
23	10 29 20.81	0.208	0.08	10 15 46.1	1.28	1.25	0.30
24	10 29 15.77	- 0.212	0.08	+ 10 16 17.1	+ 1.30	1.25	0.30
25	10 29 10.65	0.215	0.08	10 16 48.5	1.32	1.25	0.30
26	10 29 05.46	0.218	0.08	10 17 20.3	1.33	1.25	0.30
27	10 29 00.20	0.221	0.08	10 17 52.4	1.35	1.25	0.30
28	10 28 54.86	0.224	0.08	10 18 25.0	1.36	1.25	0.30
29	10 28 49.46	- 0.226	0.08	+ 10 18 57.9	+ 1.38	1.25	0.30
30	10 28 44.00	0.229	0.08	10 19 31.1	1.39	1.25	0.30
31	10 28 38.48	0.231	0.08	10 20 04.7	1.41	1.25	0.30
Feb. 1	10 28 32.89	0.234	0.08	10 20 38.6	1.42	1.25	0.30
2	10 28 27.25	0.236	0.08	10 21 12.7	1.43	1.25	0.30
3	10 28 21.55	- 0.239	0.08	+ 10 21 47.2	+ 1.44	1.25	0.30
4	10 28 15.80	0.241	0.08	10 22 21.9	1.45	1.25	0.30
5	10 28 09.99	0.243	0.08	10 22 56.9	1.46	1.25	0.30
6	10 28 04.14	0.245	0.08	10 23 32.1	1.47	1.25	0.30
7	10 27 58.24	0.247	0.08	10 24 07.6	1.48	1.25	0.30
8	10 27 52.30	- 0.249	0.08	+ 10 24 43.3	+ 1.49	1.25	0.30
9	10 27 46.31	0.250	0.08	10 25 19.3	1.50	1.25	0.30
10	10 27 40.28	0.252	0.08	10 25 55.4	1.51	1.25	0.30
11	10 27 34.22	0.253	0.08	10 26 31.7	1.51	1.25	0.30
12	10 27 28.12	0.255	0.08	10 27 08.1	1.52	1.25	0.30
13	10 27 21.98	- 0.256	0.08	+ 10 27 44.7	+ 1.53	1.25	0.30
14	10 27 15.82	0.257	0.08	10 28 21.5	1.54	1.25	0.30
15	10 27 09.63	- 0.258	0.08	+ 10 28 58.4	+ 1.54	1.25	0.30

AT TRANSIT AT GREENWICH.

Date.	Apparent Right Ascension.	Var. per Hour of Long.	Sidereal Time of S. D. passing Meridian.	Apparent Declination.	Var. per Hour of Long.	Semi- diameter.	Hori- zontal Parallax.
Feb. 15	^h 10 ^m 27 ^s 09.63	— 0.258	0.08	+10° 28' 58.4"	+ 1.54	1.25	0.30
16	10 27 03.42	0.259	0.08	10 29 35.4	1.54	1.25	0.30
17	10 26 57.18	0.260	0.08	10 30 12.5	1.55	1.25	0.30
18	10 26 50.92	0.261	0.08	10 30 49.6	1.55	1.25	0.30
19	10 26 44.65	0.262	0.08	10 31 26.8	1.55	1.25	0.30
20	10 26 38.36	— 0.262	0.08	+10 32 04.1	+ 1.55	1.25	0.30
21	10 26 32.06	0.263	0.08	10 32 41.4	1.55	1.25	0.30
22	10 26 25.75	0.263	0.08	10 33 18.7	1.55	1.25	0.30
23	10 26 19.44	0.263	0.08	10 33 56.0	1.55	1.25	0.30
24	10 26 13.12	0.263	0.08	10 34 33.3	1.55	1.25	0.30
25	10 26 06.80	— 0.263	0.08	+10 35 10.5	+ 1.55	1.25	0.30
26	10 26 00.48	0.263	0.08	10 35 47.7	1.55	1.25	0.30
27	10 25 54.16	0.263	0.08	10 36 24.8	1.55	1.25	0.30
27	10 25 47.86	0.262	0.08	10 37 01.9	1.54	1.25	0.30
28	10 25 41.56	0.262	0.08	10 37 38.9	1.54	1.25	0.30
Mar. 1	10 25 35.28	— 0.261	0.08	+10 38 15.7	+ 1.53	1.25	0.30
2	10 25 29.01	0.261	0.08	10 38 52.4	1.52	1.25	0.30
3	10 25 22.75	0.260	0.08	10 39 28.9	1.52	1.25	0.30
4	10 25 16.51	0.260	0.08	10 40 05.4	1.52	1.25	0.30
5	10 25 10.29	0.259	0.08	10 40 41.7	1.51	1.25	0.30
6	10 25 04.10	— 0.257	0.08	+10 41 17.8	+ 1.50	1.25	0.30
7	10 24 57.94	0.256	0.08	10 41 53.7	1.49	1.25	0.30
8	10 24 51.80	0.255	0.08	10 42 29.4	1.48	1.25	0.30
9	10 24 45.68	0.254	0.08	10 43 04.9	1.47	1.25	0.30
10	10 24 39.60	0.252	0.08	10 43 40.2	1.46	1.25	0.30
11	10 24 33.56	— 0.251	0.08	+10 44 15.2	+ 1.45	1.25	0.30
12	10 24 27.56	0.249	0.08	10 44 50.0	1.44	1.25	0.30
13	10 24 21.60	0.247	0.08	10 45 24.5	1.43	1.25	0.30
14	10 24 15.68	0.246	0.08	10 45 58.8	1.42	1.25	0.30
15	10 24 09.80	0.244	0.08	10 46 32.7	1.41	1.25	0.30
16	10 24 03.97	— 0.242	0.08	+10 47 06.4	+ 1.40	1.25	0.30
17	10 23 58.19	0.240	0.08	10 47 39.7	1.38	1.25	0.30
18	10 23 52.46	0.237	0.08	10 48 12.7	1.37	1.25	0.30
19	10 23 46.79	0.235	0.08	10 48 45.4	1.35	1.25	0.30
20	10 23 41.17	0.233	0.08	10 49 17.7	1.34	1.25	0.30
21	10 23 35.61	— 0.230	0.08	+10 49 49.6	+ 1.32	1.25	0.30
22	10 23 30.11	0.228	0.08	10 50 21.1	1.30	1.25	0.30
23	10 23 24.68	0.225	0.08	10 50 52.2	1.29	1.25	0.30
24	10 23 19.31	0.222	0.08	10 51 23.0	1.27	1.25	0.30
25	10 23 14.01	0.219	0.08	10 51 53.3	1.25	1.25	0.30
26	10 23 08.78	— 0.216	0.08	+10 52 23.1	+ 1.23	1.25	0.30
27	10 23 03.62	0.213	0.08	10 52 52.5	1.22	1.25	0.30
28	10 22 58.54	0.210	0.08	10 53 21.5	1.20	1.25	0.30
29	10 22 53.53	0.207	0.08	10 53 50.0	1.18	1.25	0.30
30	10 22 48.60	0.204	0.08	10 54 18.0	1.16	1.25	0.30
31	10 22 43.75	— 0.201	0.08	+10 54 45.5	+ 1.14	1.25	0.30
Apr. 1	10 22 38.97	— 0.197	0.08	+10 55 12.6	+ 1.12	1.25	0.30

NEPTUNE, 1931.

AT TRANSIT AT GREENWICH.

Date.	Apparent Right Ascension.	Var. per Hour of Long.	Sidereal Time of S. D. passing Meridian.	Apparent Declination.	Var. per Hour of Long.	Semi- diameter.	Hori- zontal Parallax.
Apr. 1	^h 10 ^m 22 ^s 38.97	- 0.197	0.08	+10 55 12.6	+ 1.12	1.25	0.30
2	10 22 34.28	0.194	0.08	10 55 39.2	1.10	1.25	0.30
3	10 22 29.67	0.190	0.08	10 56 05.3	1.07	1.24	0.30
4	10 22 25.15	0.187	0.08	10 56 30.8	1.05	1.24	0.30
5	10 22 20.71	0.183	0.08	10 56 55.8	1.03	1.24	0.30
6	10 22 16.36	- 0.179	0.08	+10 57 20.2	+ 1.01	1.24	0.30
7	10 22 12.11	0.175	0.08	10 57 44.1	0.99	1.24	0.30
8	10 22 07.94	0.172	0.08	10 58 07.5	0.96	1.24	0.30
9	10 22 03.87	0.168	0.08	10 58 30.3	0.94	1.24	0.30
10	10 21 59.90	0.164	0.08	10 58 52.6	0.92	1.24	0.30
11	10 21 56.02	- 0.160	0.08	+10 59 14.3	+ 0.89	1.24	0.30
12	10 21 52.24	0.155	0.08	10 59 35.4	0.87	1.24	0.30
13	10 21 48.56	0.151	0.08	10 59 55.9	0.84	1.24	0.30
14	10 21 44.98	0.147	0.08	11 00 15.8	0.82	1.24	0.30
15	10 21 41.50	0.143	0.08	11 00 35.1	0.79	1.24	0.30
16	10 21 38.13	- 0.138	0.08	+11 00 53.8	+ 0.77	1.24	0.30
17	10 21 34.86	0.134	0.08	11 01 11.9	0.74	1.24	0.30
18	10 21 31.70	0.129	0.08	11 01 29.3	0.71	1.24	0.30
19	10 21 28.65	0.125	0.08	11 01 46.1	0.69	1.24	0.30
20	10 21 25.70	0.121	0.08	11 02 02.3	0.66	1.24	0.30
21	10 21 22.86	- 0.116	0.08	+11 02 17.8	+ 0.63	1.24	0.30
22	10 21 20.14	0.111	0.08	11 02 32.6	0.60	1.24	0.30
23	10 21 17.53	0.106	0.08	11 02 46.8	0.58	1.23	0.30
24	10 21 15.04	0.101	0.08	11 03 00.4	0.55	1.23	0.30
25	10 21 12.66	0.097	0.08	11 03 13.3	0.52	1.23	0.30
26	10 21 10.39	- 0.092	0.08	+11 03 25.5	+ 0.49	1.23	0.30
27	10 21 08.23	0.087	0.08	11 03 37.0	0.46	1.23	0.30
28	10 21 06.19	0.082	0.08	11 03 47.8	0.44	1.23	0.30
29	10 21 04.27	0.078	0.08	11 03 58.0	0.41	1.23	0.30
30	10 21 02.46	0.073	0.08	11 04 07.5	0.38	1.23	0.30
May 1	10 21 00.78	- 0.068	0.08	+11 04 16.3	+ 0.35	1.23	0.30
2	10 20 59.21	0.063	0.08	11 04 24.4	0.32	1.23	0.30
3	10 20 57.76	0.058	0.08	11 04 31.8	0.29	1.23	0.30
4	10 20 56.43	0.053	0.08	11 04 38.5	0.27	1.23	0.30
5	10 20 55.22	0.048	0.08	11 04 44.6	0.24	1.23	0.29
6	10 20 54.13	- 0.043	0.08	+11 04 50.0	+ 0.21	1.23	0.29
7	10 20 53.17	0.038	0.08	11 04 54.6	0.18	1.23	0.29
8	10 20 52.32	0.033	0.08	11 04 58.6	0.15	1.23	0.29
9	10 20 51.60	0.028	0.08	11 05 01.9	0.12	1.22	0.29
10	10 20 50.99	0.023	0.08	11 05 04.5	0.09	1.22	0.29
11	10 20 50.51	- 0.017	0.08	+11 05 06.4	+ 0.06	1.22	0.29
12	10 20 50.15	0.012	0.08	11 05 07.5	0.03	1.22	0.29
13	10 20 49.92	0.007	0.08	11 05 07.9	0.00	1.22	0.29
14	10 20 49.81	- 0.002	0.08	11 05 07.7	- 0.03	1.22	0.29
15	10 20 49.83	+ 0.003	0.08	11 05 06.7	0.06	1.22	0.29
16	10 20 49.97	+ 0.008	0.08	+11 05 05.0	- 0.09	1.22	0.29
17	10 20 50.23	+ 0.014	0.08	+11 05 02.6	- 0.12	1.22	0.29

NEPTUNE, 1931.

AT TRANSIT AT GREENWICH.

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Date.	Apparent Right Ascension.	Var. per Hour of Long.	Sidereal Time of S. D. passing Meridian.	Apparent Declination.	Var. per Hour of Long.	Semi- diameter.	Hori- zontal Parallax.
May 17	^h 10 ^m 20 ^s 50.23	^s + 0.014	0.08	[°] +11 ['] 05 ["] 02.6	["] - 0.12	1.22	0.29
18	10 20 50.62	0.019	0.08	11 04 59.4	0.15	1.22	0.29
19	10 20 51.13	0.024	0.08	11 04 55.6	0.17	1.22	0.29
20	10 20 51.77	0.029	0.08	11 04 51.1	0.20	1.22	0.29
21	10 20 52.53	0.034	0.08	11 04 45.8	0.23	1.21	0.29
22	10 20 53.41	+ 0.039	0.08	+11 04 39.8	- 0.26	1.21	0.29
23	10 20 54.42	0.045	0.08	11 04 33.2	0.29	1.21	0.29
24	10 20 55.55	0.050	0.08	11 04 25.8	0.32	1.21	0.29
25	10 20 56.81	0.055	0.08	11 04 17.7	0.35	1.21	0.29
26	10 20 58.19	0.060	0.08	11 04 09.0	0.38	1.21	0.29
27	10 20 59.69	+ 0.065	0.08	+11 03 59.5	- 0.41	1.21	0.29
28	10 21 01.31	0.070	0.08	11 03 49.4	0.44	1.21	0.29
29	10 21 03.05	0.075	0.08	11 03 38.5	0.47	1.21	0.29
30	10 21 04.92	0.080	0.08	11 03 26.9	0.50	1.21	0.29
31	10 21 06.90	0.085	0.08	11 03 14.7	0.52	1.21	0.29
June 1	10 21 09.00	+ 0.090	0.08	+11 03 01.8	- 0.55	1.21	0.29
2	10 21 11.23	0.095	0.08	11 02 48.2	0.58	1.21	0.29
3	10 21 13.57	0.100	0.08	11 02 33.9	0.61	1.21	0.29
4	10 21 16.03	0.105	0.08	11 02 19.0	0.64	1.21	0.29
5	10 21 18.61	0.110	0.08	11 02 03.4	0.66	1.21	0.29
6	10 21 21.31	+ 0.115	0.08	+11 01 47.1	- 0.69	1.20	0.29
7	10 21 24.13	0.120	0.08	11 01 30.2	0.72	1.20	0.29
8	10 21 27.06	0.125	0.08	11 01 12.6	0.75	1.20	0.29
9	10 21 30.11	0.130	0.08	11 00 54.3	0.77	1.20	0.29
10	10 21 33.28	0.134	0.08	11 00 35.4	0.80	1.20	0.29
11	10 21 36.56	+ 0.139	0.08	+11 00 15.8	- 0.83	1.20	0.29
12	10 21 39.96	0.144	0.08	10 59 55.6	0.86	1.20	0.29
13	10 21 43.47	0.149	0.08	10 59 34.7	0.88	1.20	0.29
14	10 21 47.09	0.153	0.08	10 59 13.2	0.91	1.20	0.29
15	10 21 50.82	0.158	0.08	10 58 51.1	0.94	1.20	0.29
16	10 21 54.67	+ 0.163	0.08	+10 58 28.3	- 0.96	1.20	0.29
17	10 21 58.63	0.167	0.08	10 58 04.8	0.99	1.20	0.29
18	10 22 02.70	0.172	0.08	10 57 40.8	1.01	1.20	0.29
19	10 22 06.87	0.176	0.08	10 57 16.2	1.04	1.20	0.29
20	10 22 11.15	0.180	0.08	10 56 50.9	1.06	1.20	0.29
21	10 22 15.53	+ 0.185	0.08	+10 56 25.1	- 1.09	1.20	0.29
22	10 22 20.02	0.189	0.08	10 55 58.6	1.11	1.19	0.29
23	10 22 24.62	0.194	0.08	10 55 31.6	1.14	1.19	0.29
24	10 22 29.32	0.198	0.08	10 55 03.9	1.16	1.19	0.29
25	10 22 34.12	0.202	0.08	10 54 35.7	1.19	1.19	0.29
26	10 22 39.02	+ 0.206	0.08	+10 54 07.0	- 1.21	1.19	0.29
27	10 22 44.02	0.210	0.08	10 53 37.7	1.23	1.19	0.29
28	10 22 49.12	+ 0.214	0.08	+10 53 07.9	- 1.25	1.19	0.29

Date.	Log A	Log B	Log C	Log D	Date.	Log A	Log B	Log C	Log D
Jan. 1	9.0199m	0.9074m	0.4964m	1.3050	Feb. 16	8.7124	0.9512m	1.1941m	1.0546
2	9.0033m	0.9079m	0.5398m	1.3036	17	8.7346	0.9522m	1.1991m	1.0429
3	8.9861m	0.9085m	0.5790m	1.3021	18	8.7555	0.9531m	1.2039m	1.0307
4	8.9683m	0.9091m	0.6149m	1.3004	19	8.7752	0.9541m	1.2085m	1.0180
5	8.9499m	0.9098m	0.6479m	1.2986	20	8.7940	0.9550m	1.2129m	1.0048
6	8.9306m	0.9104m	0.6784m	1.2967	21	8.8116	0.9559m	1.2172m	0.9911
7	8.9105m	0.9111m	0.7068m	1.2945	22	8.8285	0.9567m	1.2213m	0.9768
8	8.8895m	0.9117m	0.7334m	1.2923	23	8.8447	0.9576m	1.2252m	0.9619
9	8.8676m	0.9125m	0.7582m	1.2899	24	8.8600	0.9585m	1.2289m	0.9463
10	8.8446m	0.9133m	0.7816m	1.2873	25	8.8747	0.9593m	1.2325m	0.9300
11	8.8205m	0.9141m	0.8037m	1.2846	26	8.8887	0.9601m	1.2360m	0.9129
12	8.7950m	0.9149m	0.8245m	1.2818	27	8.9022	0.9609m	1.2391m	0.8950
13	8.7683m	0.9157m	0.8443m	1.2788	28	8.9152	0.9617m	1.2422m	0.8762
14	8.7400m	0.9166m	0.8631m	1.2756	Mar. 1	8.9277	0.9624m	1.2451m	0.8564
15	8.7098m	0.9175m	0.8810m	1.2723	2	8.9397	0.9630m	1.2479m	0.8356
16	8.6775m	0.9184m	0.8980m	1.2687	3	8.9514	0.9637m	1.2505m	0.8135
17	8.6430m	0.9193m	0.9143m	1.2651	4	8.9627	0.9644m	1.2530m	0.7902
18	8.6057m	0.9203m	0.9298m	1.2612	5	8.9735	0.9650m	1.2553m	0.7654
19	8.5651m	0.9213m	0.9447m	1.2573	6	8.9840	0.9656m	1.2575m	0.7390
20	8.5206m	0.9223m	0.9589m	1.2531	7	8.9942	0.9661m	1.2596m	0.7107
21	8.4719m	0.9233m	0.9725m	1.2487	8	9.0041	0.9667m	1.2615m	0.6804
22	8.4173m	0.9243m	0.9856m	1.2441	9	9.0137	0.9672m	1.2632m	0.6476
23	8.3555m	0.9254m	0.9982m	1.2394	10	9.0231	0.9676m	1.2648m	0.6121
24	8.2835m	0.9264m	1.0103m	1.2345	11	9.0323	0.9681m	1.2663m	0.5733
25	8.1981m	0.9275m	1.0219m	1.2294	12	9.0412	0.9685m	1.2676m	0.5305
26	8.0931m	0.9285m	1.0331m	1.2241	13	9.0498	0.9689m	1.2688m	0.4829
27	7.9552m	0.9296m	1.0439m	1.2186	14	9.0583	0.9692m	1.2699m	0.4294
28	7.7559m	0.9307m	1.0543m	1.2128	15	9.0665	0.9695m	1.2708m	0.3681
29	7.3802m	0.9318m	1.0643m	1.2069	16	9.0747	0.9698m	1.2716m	0.2967
30	6.9395	0.9329m	1.0739m	1.2007	17	9.0826	0.9701m	1.2723m	0.2110
31	7.6128	0.9340m	1.0832m	1.1944	18	9.0904	0.9703m	1.2729m	0.1042
Feb. 1	7.8639	0.9352m	1.0921m	1.1878	19	9.0980	0.9704m	1.2733m	9.9620
2	8.0199	0.9363m	1.1008m	1.1809	20	9.1055	0.9706m	1.2735m	9.7490
3	8.1342	0.9374m	1.1091m	1.1738	21	9.1128	0.9708m	1.2737m	9.3145
4	8.2235	0.9385m	1.1172m	1.1665	22	9.1201	0.9709m	1.2737m	9.1720m
5	8.2969	0.9396m	1.1249m	1.1589	23	9.1271	0.9709m	1.2736m	9.7017m
6	8.3589	0.9407m	1.1324m	1.1510	24	9.1341	0.9710m	1.2733m	9.9332m
7	8.4126	0.9418m	1.1396m	1.1428	25	9.1410	0.9710m	1.2729m	0.0832m
8	8.4601	0.9429m	1.1466m	1.1344	26	9.1478	0.9710m	1.2724m	0.1943m
9	8.5024	0.9439m	1.1533m	1.1256	27	9.1545	0.9709m	1.2718m	0.2826m
10	8.5405	0.9450m	1.1598m	1.1165	28	9.1612	0.9708m	1.2710m	0.3557m
11	8.5751	0.9461m	1.1661m	1.1071	29	9.1677	0.9707m	1.2701m	0.4182m
12	8.6069	0.9471m	1.1721m	1.0974	30	9.1742	0.9706m	1.2691m	0.4726m
13	8.6363	0.9481m	1.1779m	1.0873	31	9.1806	0.9704m	1.2679m	0.5209m
14	8.6635	0.9492m	1.1835m	1.0768	Apr. 1	9.1869	0.9702m	1.2666m	0.5641m
15	8.6888	0.9502m	1.1889m	1.0659	2	9.1932	0.9700m	1.2652m	0.6033m
16	8.7124	0.9512m	1.1941m	1.0546	3	9.1994	0.9697m	1.2636m	0.6391m

BESSELIAN DAY NUMBERS, 1931.

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Date.	Log A	Log B	Log C	Log D	Date.	Log A	Log B	Log C	Log D
Apr. 1	9.1869	0.9702 n	1.2666 n	0.5641 n	May 17	9.4447	0.9410 n	1.0307 n	1.2253 n
2	9.1932	0.9700 n	1.2652 n	0.5603 n	18	9.4498	0.9402 n	1.0200 n	1.2302 n
3	9.1994	0.9697 n	1.2636 n	0.56391 n	19	9.4550	0.9395 n	1.0090 n	1.2351 n
4	9.2056	0.9694 n	1.2619 n	0.56721 n	20	9.4601	0.9388 n	0.9975 n	1.2397 n
5	9.2117	0.9691 n	1.2601 n	0.57025 n	21	9.4651	0.9381 n	0.9856 n	1.2442 n
6	9.2177	0.9688 n	1.2581 n	0.57309 n	22	9.4702	0.9374 n	0.9732 n	1.2485 n
7	9.2237	0.9684 n	1.2560 n	0.57574 n	23	9.4752	0.9367 n	0.9603 n	1.2526 n
8	9.2297	0.9680 n	1.2538 n	0.57822 n	24	9.4802	0.9360 n	0.9470 n	1.2566 n
9	9.2357	0.9676 n	1.2514 n	0.58055 n	25	9.4852	0.9353 n	0.9331 n	1.2604 n
10	9.2416	0.9672 n	1.2489 n	0.58276 n	26	9.4902	0.9347 n	0.9186 n	1.2641 n
11	9.2474	0.9667 n	1.2463 n	0.58484 n	27	9.4951	0.9341 n	0.9035 n	1.2676 n
12	9.2533	0.9662 n	1.2435 n	0.58681 n	28	9.5000	0.9335 n	0.8877 n	1.2709 n
13	9.2591	0.9657 n	1.2405 n	0.58869 n	29	9.5048	0.9329 n	0.8712 n	1.2741 n
14	9.2648	0.9652 n	1.2374 n	0.59047 n	30	9.5097	0.9323 n	0.8539 n	1.2772 n
15	9.2706	0.9646 n	1.2342 n	0.59217 n	31	9.5145	0.9318 n	0.8358 n	1.2801 n
16	9.2763	0.9640 n	1.2308 n	0.59379 n	June 1	9.5193	0.9313 n	0.8168 n	1.2829 n
17	9.2820	0.9635 n	1.2272 n	0.59535 n	2	9.5240	0.9307 n	0.7968 n	1.2855 n
18	9.2877	0.9628 n	1.2235 n	0.59683 n	3	9.5287	0.9302 n	0.7757 n	1.2880 n
19	9.2933	0.9622 n	1.2197 n	0.59826 n	4	9.5334	0.9298 n	0.7535 n	1.2904 n
20	9.2990	0.9616 n	1.2157 n	0.59962 n	5	9.5381	0.9294 n	0.7299 n	1.2926 n
21	9.3046	0.9609 n	1.2115 n	1.0093 n	6	9.5427	0.9290 n	0.7048 n	1.2947 n
22	9.3102	0.9602 n	1.2071 n	1.0219 n	7	9.5473	0.9286 n	0.6780 n	1.2967 n
23	9.3158	0.9595 n	1.2026 n	1.0340 n	8	9.5519	0.9283 n	0.6494 n	1.2985 n
24	9.3213	0.9588 n	1.1979 n	1.0457 n	9	9.5564	0.9280 n	0.6187 n	1.3002 n
25	9.3269	0.9581 n	1.1931 n	1.0569 n	10	9.5609	0.9277 n	0.5854 n	1.3018 n
26	9.3324	0.9574 n	1.1880 n	1.0677 n	11	9.5654	0.9274 n	0.5493 n	1.3033 n
27	9.3379	0.9566 n	1.1828 n	1.0781 n	12	9.5698	0.9272 n	0.5098 n	1.3046 n
28	9.3434	0.9559 n	1.1774 n	1.0882 n	13	9.5742	0.9270 n	0.4662 n	1.3058 n
29	9.3489	0.9552 n	1.1718 n	1.0979 n	14	9.5786	0.9268 n	0.4176 n	1.3069 n
30	9.3543	0.9544 n	1.1660 n	1.1072 n	15	9.5829	0.9266 n	0.3628 n	1.3078 n
May 1	9.3598	0.9536 n	1.1600 n	1.1162 n	16	9.5872	0.9265 n	0.2998 n	1.3087 n
2	9.3653	0.9528 n	1.1538 n	1.1249 n	17	9.5914	0.9264 n	0.2261 n	1.3094 n
3	9.3707	0.9520 n	1.1474 n	1.1334 n	18	9.5956	0.9264 n	0.1370 n	1.3100 n
4	9.3761	0.9512 n	1.1407 n	1.1415 n	19	9.5998	0.9263 n	0.0248 n	1.3104 n
5	9.3815	0.9504 n	1.1339 n	1.1493 n	20	9.6040	0.9263 n	9.8729 n	1.3108 n
6	9.3868	0.9496 n	1.1268 n	1.1569 n	21	9.6081	0.9263 n	9.6370 n	1.3110 n
7	9.3921	0.9489 n	1.1194 n	1.1643 n	22	9.6121	0.9264 n	9.0814 n	1.3111 n
8	9.3975	0.9481 n	1.1119 n	1.1714 n	23	9.6162	0.9265 n	9.2833	1.3111 n
9	9.4028	0.9473 n	1.1040 n	1.1782 n	24	9.6202	0.9266 n	9.7030	1.3110 n
10	9.4081	0.9465 n	1.0959 n	1.1848 n	25	9.6241	0.9267 n	9.9122	1.3107 n
11	9.4134	0.9457 n	1.0875 n	1.1912 n	26	9.6280	0.9269 n	0.0528	1.3103 n
12	9.4187	0.9449 n	1.0788 n	1.1974 n	27	9.6319	0.9271 n	0.1587	1.3098 n
13	9.4239	0.9441 n	1.0699 n	1.2034 n	28	9.6357	0.9273 n	0.2437	1.3092 n
14	9.4291	0.9433 n	1.0606 n	1.2091 n	29	9.6395	0.9276 n	0.3146	1.3085 n
15	9.4344	0.9425 n	1.0510 n	1.2147 n	30	9.6433	0.9279 n	0.3754	1.3076 n
16	9.4395	0.9417 n	1.0410 n	1.2201 n	July 1	9.6470	0.9282 n	0.4286	1.3066 n
17	9.4447	0.9410 n	1.0307 n	1.2253 n	2	9.6507	0.9285 n	0.4759	1.3055 n

Date.	Log A	Log B	Log C	Log D	Date.	Log A	Log B	Log C	Log D
July 1	9·6470	0·9282 ⁿ	0·4286	1·3066 ⁿ	Aug. 16	9·7771	0·9627 ⁿ	1·1713	1·0988 ⁿ
2	9·6507	0·9285 ⁿ	0·4759	1·3055 ⁿ	17	9·7792	0·9636 ⁿ	1·1768	1·0892 ⁿ
3	9·6543	0·9289 ⁿ	0·5185	1·3043 ⁿ	18	9·7812	0·9645 ⁿ	1·1822	1·0793 ⁿ
4	9·6579	0·9293 ⁿ	0·5571	1·3030 ⁿ	19	9·7831	0·9654 ⁿ	1·1874	1·0691 ⁿ
5	9·6615	0·9297 ⁿ	0·5925	1·3015 ⁿ	20	9·7851	0·9662 ⁿ	1·1924	1·0584 ⁿ
6	9·6650	0·9302 ⁿ	0·6251	1·2999 ⁿ	21	9·7870	0·9671 ⁿ	1·1972	1·0474 ⁿ
7	9·6685	0·9307 ⁿ	0·6553	1·2981 ⁿ	22	9·7889	0·9679 ⁿ	1·2019	1·0359 ⁿ
8	9·6720	0·9312 ⁿ	0·6834	1·2963 ⁿ	23	9·7907	0·9687 ⁿ	1·2064	1·0241 ⁿ
9	9·6754	0·9317 ⁿ	0·7097	1·2943 ⁿ	24	9·7926	0·9695 ⁿ	1·2107	1·0117 ⁿ
10	9·6787	0·9323 ⁿ	0·7344	1·2922 ⁿ	25	9·7944	0·9703 ⁿ	1·2148	0·9989 ⁿ
11	9·6821	0·9329 ⁿ	0·7577	1·2900 ⁿ	26	9·7962	0·9710 ⁿ	1·2188	0·9855 ⁿ
12	9·6854	0·9335 ⁿ	0·7797	1·2876 ⁿ	27	9·7979	0·9717 ⁿ	1·2227	0·9716 ⁿ
13	9·6886	0·9341 ⁿ	0·8004	1·2851 ⁿ	28	9·7997	0·9725 ⁿ	1·2264	0·9570 ⁿ
14	9·6918	0·9348 ⁿ	0·8202	1·2824 ⁿ	29	9·8014	0·9732 ⁿ	1·2299	0·9419 ⁿ
15	9·6950	0·9354 ⁿ	0·8389	1·2796 ⁿ	30	9·8031	0·9739 ⁿ	1·2333	0·9260 ⁿ
16	9·6981	0·9361 ⁿ	0·8568	1·2767 ⁿ	31	9·8048	0·9745 ⁿ	1·2365	0·9095 ⁿ
17	9·7012	0·9368 ⁿ	0·8738	1·2736 ⁿ	Sept. 1	9·8064	0·9752 ⁿ	1·2396	0·8921 ⁿ
18	9·7043	0·9375 ⁿ	0·8901	1·2704 ⁿ	2	9·8081	0·9758 ⁿ	1·2426	0·8739 ⁿ
19	9·7073	0·9383 ⁿ	0·9057	1·2671 ⁿ	3	9·8097	0·9764 ⁿ	1·2454	0·8547 ⁿ
20	9·7103	0·9390 ⁿ	0·9206	1·2635 ⁿ	4	9·8113	0·9769 ⁿ	1·2481	0·8345 ⁿ
21	9·7132	0·9398 ⁿ	0·9350	1·2599 ⁿ	5	9·8129	0·9775 ⁿ	1·2506	0·8132 ⁿ
22	9·7161	0·9406 ⁿ	0·9487	1·2561 ⁿ	6	9·8144	0·9781 ⁿ	1·2530	0·7906 ⁿ
23	9·7190	0·9414 ⁿ	0·9619	1·2521 ⁿ	7	9·8160	0·9786 ⁿ	1·2552	0·7666 ⁿ
24	9·7218	0·9422 ⁿ	0·9746	1·2480 ⁿ	8	9·8175	0·9791 ⁿ	1·2574	0·7411 ⁿ
25	9·7246	0·9430 ⁿ	0·9869	1·2437 ⁿ	9	9·8190	0·9795 ⁿ	1·2593	0·7139 ⁿ
26	9·7273	0·9439 ⁿ	0·9986	1·2393 ⁿ	10	9·8205	0·9800 ⁿ	1·2612	0·6847 ⁿ
27	9·7300	0·9448 ⁿ	1·0100	1·2346 ⁿ	11	9·8220	0·9804 ⁿ	1·2629	0·6532 ⁿ
28	9·7327	0·9456 ⁿ	1·0209	1·2298 ⁿ	12	9·8235	0·9807 ⁿ	1·2645	0·6191 ⁿ
29	9·7354	0·9465 ⁿ	1·0315	1·2249 ⁿ	13	9·8250	0·9811 ⁿ	1·2660	0·5820 ⁿ
30	9·7380	0·9474 ⁿ	1·0417	1·2197 ⁿ	14	9·8264	0·9815 ⁿ	1·2673	0·5412 ⁿ
31	9·7405	0·9483 ⁿ	1·0515	1·2144 ⁿ	15	9·8278	0·9817 ⁿ	1·2685	0·4960 ⁿ
Aug. 1	9·7431	0·9492 ⁿ	1·0610	1·2089 ⁿ	16	9·8293	0·9820 ⁿ	1·2696	0·4454 ⁿ
2	9·7456	0·9501 ⁿ	1·0702	1·2031 ⁿ	17	9·8307	0·9823 ⁿ	1·2706	0·3879 ⁿ
3	9·7480	0·9510 ⁿ	1·0791	1·1972 ⁿ	18	9·8321	0·9825 ⁿ	1·2714	0·3215 ⁿ
4	9·7505	0·9519 ⁿ	1·0877	1·1911 ⁿ	19	9·8335	0·9827 ⁿ	1·2721	0·2429 ⁿ
5	9·7529	0·9528 ⁿ	1·0960	1·1848 ⁿ	20	9·8349	0·9829 ⁿ	1·2727	0·1465 ⁿ
6	9·7553	0·9537 ⁿ	1·1040	1·1782 ⁿ	21	9·8363	0·9830 ⁿ	1·2731	0·0223 ⁿ
7	9·7576	0·9546 ⁿ	1·1118	1·1714 ⁿ	22	9·8377	0·9831 ⁿ	1·2734	9·8473 ⁿ
8	9·7599	0·9555 ⁿ	1·1193	1·1644 ⁿ	23	9·8391	0·9832 ⁿ	1·2736	9·5491 ⁿ
9	9·7621	0·9565 ⁿ	1·1266	1·1571 ⁿ	24	9·8404	0·9832 ⁿ	1·2737	7·6375 ⁿ
10	9·7644	0·9574 ⁿ	1·1336	1·1496 ⁿ	25	9·8418	0·9833 ⁿ	1·2736	9·5386
11	9·7666	0·9582 ⁿ	1·1404	1·1419 ⁿ	26	9·8432	0·9833 ⁿ	1·2734	9·8424
12	9·7687	0·9591 ⁿ	1·1470	1·1338 ⁿ	27	9·8445	0·9833 ⁿ	1·2731	0·0194
13	9·7709	0·9600 ⁿ	1·1534	1·1255 ⁿ	28	9·8459	0·9832 ⁿ	1·2727	0·1447
14	9·7730	0·9609 ⁿ	1·1596	1·1169 ⁿ	29	9·8472	0·9831 ⁿ	1·2721	0·2418
15	9·7751	0·9618 ⁿ	1·1655	1·1080 ⁿ	30	9·8486	0·9829 ⁿ	1·2714	0·3211
16	9·7771	0·9627 ⁿ	1·1713	1·0988 ⁿ	Oct. 1	9·8500	0·9828 ⁿ	1·2706	0·3880

Date.	Log A	Log B	Log C	Log D	Date.	Log A	Log B	Log C	Log D
Oct. 1	9·8500	0·9828 ^m	1·2706	0·3880	Nov. 16	9·9193	0·9522 ^m	1·0565	1·2116
2	9·8513	0·9826 ^m	1·2696	0·4459	17	9·9210	0·9513 ^m	1·0463	1·2173
3	9·8527	0·9824 ^m	1·2685	0·4969	18	9·9228	0·9504 ^m	1·0357	1·2228
4	9·8540	0·9822 ^m	1·2673	0·5424	19	9·9245	0·9496 ^m	1·0247	1·2281
5	9·8554	0·9819 ^m	1·2659	0·5835	20	9·9263	0·9488 ^m	1·0132	1·2333
6	9·8567	0·9816 ^m	1·2645	0·6210	21	9·9281	0·9479 ^m	1·0013	1·2382
7	9·8581	0·9813 ^m	1·2628	0·6554	22	9·9298	0·9470 ^m	0·9890	1·2429
8	9·8595	0·9809 ^m	1·2611	0·6871	23	9·9316	0·9462 ^m	0·9761	1·2475
9	9·8608	0·9805 ^m	1·2592	0·7166	24	9·9334	0·9454 ^m	0·9627	1·2519
10	9·8622	0·9801 ^m	1·2571	0·7441	25	9·9352	0·9446 ^m	0·9487	1·2561
11	9·8636	0·9797 ^m	1·2549	0·7699	26	9·9370	0·9438 ^m	0·9342	1·2601
12	9·8650	0·9792 ^m	1·2526	0·7941	27	9·9388	0·9430 ^m	0·9189	1·2640
13	9·8664	0·9788 ^m	1·2502	0·8170	28	9·9407	0·9423 ^m	0·9030	1·2677
14	9·8678	0·9783 ^m	1·2475	0·8386	29	9·9425	0·9416 ^m	0·8863	1·2712
15	9·8692	0·9777 ^m	1·2448	0·8590	30	9·9443	0·9409 ^m	0·8688	1·2746
16	9·8706	0·9772 ^m	1·2419	0·8784	Dec. 1	9·9461	0·9403 ^m	0·8504	1·2778
17	9·8720	0·9766 ^m	1·2388	0·8969	2	9·9480	0·9396 ^m	0·8311	1·2808
18	9·8735	0·9760 ^m	1·2356	0·9145	3	9·9498	0·9390 ^m	0·8107	1·2837
19	9·8749	0·9754 ^m	1·2322	0·9313	4	9·9516	0·9384 ^m	0·7891	1·2865
20	9·8763	0·9747 ^m	1·2287	0·9473	5	9·9535	0·9378 ^m	0·7663	1·2891
21	9·8778	0·9741 ^m	1·2250	0·9627	6	9·9553	0·9372 ^m	0·7420	1·2915
22	9·8793	0·9734 ^m	1·2211	0·9774	7	9·9572	0·9367 ^m	0·7162	1·2938
23	9·8807	0·9727 ^m	1·2171	0·9915	8	9·9590	0·9362 ^m	0·6886	1·2959
24	9·8822	0·9720 ^m	1·2129	1·0051	9	9·9609	0·9357 ^m	0·6589	1·2979
25	9·8837	0·9712 ^m	1·2085	1·0181	10	9·9627	0·9353 ^m	0·6269	1·2998
26	9·8852	0·9705 ^m	1·2039	1·0306	11	9·9645	0·9349 ^m	0·5922	1·3015
27	9·8867	0·9697 ^m	1·1992	1·0427	12	9·9664	0·9345 ^m	0·5543	1·3031
28	9·8883	0·9689 ^m	1·1943	1·0543	13	9·9682	0·9342 ^m	0·5126	1·3045
29	9·8898	0·9681 ^m	1·1891	1·0654	14	9·9701	0·9339 ^m	0·4664	1·3058
30	9·8913	0·9673 ^m	1·1838	1·0762	15	9·9719	0·9336 ^m	0·4145	1·3069
31	9·8929	0·9665 ^m	1·1783	1·0866	16	9·9737	0·9333 ^m	0·3553	1·3079
Nov. 1	9·8945	0·9656 ^m	1·1725	1·0966	17	9·9755	0·9331 ^m	0·2866	1·3088
2	9·8961	0·9648 ^m	1·1666	1·1063	18	9·9774	0·9330 ^m	0·2048	1·3095
3	9·8976	0·9639 ^m	1·1604	1·1156	19	9·9792	0·9328 ^m	0·1038	1·3101
4	9·8992	0·9630 ^m	1·1540	1·1246	20	9·9810	0·9327 ^m	9·9716	1·3106
5	9·9009	0·9622 ^m	1·1474	1·1333	21	9·9828	0·9326 ^m	9·7805	1·3109
6	9·9025	0·9613 ^m	1·1405	1·1417	22	9·9846	0·9326 ^m	9·4304	1·3111
7	9·9041	0·9604 ^m	1·1334	1·1499	23	9·9864	0·9326 ^m	8·8084 ^m	1·3114
8	9·9058	0·9595 ^m	1·1260	1·1577	24	9·9882	0·9326 ^m	9·6000 ^m	1·3110
9	9·9074	0·9586 ^m	1·1184	1·1653	25	9·9899	0·9327 ^m	9·8645 ^m	1·3108
10	9·9091	0·9577 ^m	1·1105	1·1726	26	9·9917	0·9328 ^m	0·0275 ^m	1·3104
11	9·9108	0·9567 ^m	1·1023	1·1797	27	9·9935	0·9329 ^m	0·1457 ^m	1·3099
12	9·9125	0·9558 ^m	1·0937	1·1865	28	9·9952	0·9331 ^m	0·2384 ^m	1·3093
13	9·9142	0·9549 ^m	1·0849	1·1931	29	9·9970	0·9333 ^m	0·3146 ^m	1·3085
14	9·9159	0·9540 ^m	1·0758	1·1995	30	9·9987	0·9335 ^m	0·3794 ^m	1·3076
15	9·9176	0·9531 ^m	1·0663	1·2056	31	0·0004	0·9338 ^m	0·4356 ^m	1·3065
16	9·9193	0·9522 ^m	1·0565	1·2116	32	0·0021	0·9341 ^m	0·4852 ^m	1·3053

BESSELIAN DAY NUMBERS, 1931.

Date.	A	B	C	D	A'	B'
Jan. 1	- 0.1047	- 8.08	- 3.14	+ 20.18	- 0.0059	+ 0.03
2	.1008	8.09	3.47	20.12	- .0047	+ .08
3	.0969	8.10	3.79	20.05	- .0027	+ .10
4	.0930	8.11	4.12	19.97	- .0001	+ .11
5	.0891	8.12	4.44	19.89	+ .0024	+ .09
6	- 0.0852	- 8.14	- 4.77	+ 19.80	+ 0.0042	+ 0.05
7	.0814	8.15	5.09	19.70	+ .0050	- .01
8	.0775	8.16	5.41	19.60	+ .0046	- .06
9	.0737	8.18	5.73	19.49	+ .0031	- .10
10	.0699	8.19	6.05	19.38	+ .0010	- .11
11	- 0.0661	- 8.21	- 6.36	+ 19.26	- 0.0012	- 0.10
12	.0624	8.22	6.68	19.13	- .0028	- .06
13	.0587	8.24	6.99	19.00	- .0035	- .02
14	.0550	8.25	7.30	18.86	- .0032	+ .03
15	.0513	8.27	7.60	18.72	- .0020	+ .07
16	- 0.0476	- 8.29	- 7.91	+ 18.57	- 0.0002	+ 0.10
17	.0440	8.31	8.21	18.41	+ .0017	+ .10
18	.0403	8.32	8.51	18.25	+ .0034	+ .09
19	.0367	8.34	8.80	18.08	+ .0045	+ .05
20	.0332	8.36	9.10	17.91	+ .0048	+ .01
21	- 0.0296	- 8.38	- 9.39	+ 17.73	+ 0.0044	- 0.03
22	.0261	8.40	9.67	17.54	+ .0032	- .06
23	.0227	8.42	9.96	17.35	+ .0014	- .09
24	.0192	8.44	10.24	17.16	- .0007	- .10
25	.0158	8.46	10.52	16.96	- .0029	- .09
26	- 0.0124	- 8.48	- 10.79	+ 16.75	- 0.0048	- 0.07
27	.0090	8.50	11.06	16.54	- .0060	- .03
28	.0057	8.53	11.33	16.32	- .0062	+ .02
29	- .0024	8.55	11.60	16.10	- .0054	+ .06
30	+ .0009	8.57	11.85	15.87	- .0037	+ .10
31	+ 0.0041	- 8.59	- 12.11	+ 15.65	- 0.0013	+ 0.11
Feb. 1	.0073	8.61	12.36	15.41	+ .0012	+ .10
2	.0105	8.64	12.61	15.17	+ .0033	+ .06
3	.0136	8.66	12.86	14.92	+ .0046	+ .01
4	.0167	8.68	13.10	14.67	+ .0046	- .04
5	+ 0.0198	- 8.70	- 13.33	+ 14.42	+ 0.0036	- 0.09
6	.0229	8.72	13.56	14.16	+ .0017	- .11
7	.0259	8.75	13.79	13.89	- .0004	- .11
8	.0289	8.77	14.02	13.63	- .0022	- .08
9	.0318	8.79	14.23	13.35	- .0032	- .03
10	+ 0.0347	- 8.81	- 14.45	+ 13.08	- 0.0032	+ 0.02
11	.0376	8.83	14.66	12.80	- .0022	+ .06
12	.0405	8.85	14.86	12.51	- .0006	+ .09
13	.0433	8.87	15.06	12.23	+ .0014	+ .10
14	.0461	8.90	15.26	11.93	+ .0032	+ .09
15	+ 0.0488	- 8.92	- 15.45	+ 11.64	+ 0.0045	+ 0.06
16	+ 0.0516	- 8.94	- 15.64	+ 11.34	+ 0.0050	+ 0.03

Date.	A	B	C	D	A'	B'
Feb. 16	+ 0.0516	- 8.94	- 15.64	+ 11.34	+ 0.0050	+ 0.03
17	.0543	8.96	15.82	11.04	+ .0048	- .02
18	.0569	8.98	15.99	10.73	+ .0038	- .06
19	.0596	9.00	16.16	10.42	+ .0021	- .08
20	.0622	9.02	16.33	10.11	+ .0001	- .10
21	+ 0.0648	- 9.03	- 16.49	+ 9.80	- 0.0021	- 0.10
22	.0674	9.05	16.65	9.48	- .0041	- .08
23	.0699	9.07	16.80	9.16	- .0056	- .04
24	.0724	9.09	16.94	8.84	- .0062	.00
25	.0749	9.11	17.08	8.51	- .0058	+ .05
26	+ 0.0774	- 9.12	- 17.22	+ 8.18	- 0.0045	+ 0.09
27	.0798	9.14	17.34	7.85	- .0023	+ .11
28	.0823	9.15	17.47	7.52	+ .0001	+ .10
Mar. 1	.0847	9.17	17.58	7.18	+ .0023	+ .07
2	.0870	9.18	17.70	6.85	+ .0038	+ .03
3	+ 0.0894	- 9.20	- 17.80	+ 6.51	+ 0.0043	- 0.02
4	.0918	9.21	17.91	6.17	+ .0036	- .07
5	.0941	9.23	18.00	5.83	+ .0020	- .10
6	.0964	9.24	18.09	5.48	.0000	- .11
7	.0987	9.25	18.18	5.14	- .0019	- .09
8	+ 0.1009	- 9.26	- 18.26	+ 4.79	- 0.0031	- 0.05
9	.1032	9.27	18.33	4.44	- .0034	.00
10	.1055	9.28	18.40	4.09	- .0026	+ .05
11	.1077	9.29	18.46	3.74	- .0010	+ .09
12	.1099	9.30	18.52	3.39	+ .0010	+ .10
13	+ 0.1122	- 9.31	- 18.57	+ 3.04	+ 0.0029	+ 0.10
14	.1144	9.32	18.62	2.69	+ .0044	+ .07
15	.1166	9.32	18.66	2.33	+ .0052	+ .04
16	.1188	9.33	18.69	1.98	+ .0052	.00
17	.1209	9.33	18.72	1.63	+ .0044	- .04
18	+ 0.1231	- 9.34	- 18.75	+ 1.27	+ 0.0029	- 0.08
19	.1253	9.34	18.76	0.92	+ .0009	- .10
20	.1275	9.35	18.77	0.56	- .0012	- .10
21	.1297	9.35	18.78	+ 0.21	- .0033	- .08
22	.1318	9.35	18.78	- 0.15	- .0049	- .05
23	+ 0.1340	- 9.35	- 18.78	- 0.50	- 0.0059	- 0.01
24	.1362	9.35	18.76	0.86	- .0059	+ .04
25	.1384	9.35	18.75	1.21	- .0048	+ .08
26	.1405	9.35	18.72	1.56	- .0030	+ .10
27	.1427	9.35	18.70	1.92	- .0007	+ .11
28	+ 0.1449	- 9.35	- 18.66	- 2.27	+ 0.0016	+ 0.09
29	.1471	9.35	18.63	2.62	+ .0033	+ .05
30	.1493	9.34	18.58	2.97	+ .0040	- .01
31	.1516	9.34	18.53	3.32	+ .0036	- .06
Apr. 1	.1538	9.34	18.48	3.66	+ .0021	- .10
2	+ 0.1560	- 9.33	- 18.42	- 4.01	+ 0.0002	- 0.11
3	+ 0.1583	- 9.33	- 18.35	- 4.36	- 0.0017	- 0.10

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Date.	A	B	C	D	A'	B'
Apr. 1	+ 0.1538	- 9.34	- 18.48	- 3.66	+ 0.0021	- 0.10
2	.1560	9.33	18.42	4.01	+ .0002	- .11
3	.1583	9.33	18.35	4.36	- .0017	- .10
4	.1605	9.32	18.28	4.70	- .0032	- .06
5	.1628	9.31	18.20	5.04	- .0037	- .01
6	+ 0.1651	- 9.31	- 18.12	- 5.38	- 0.0032	+ 0.04
7	.1674	9.30	18.03	5.72	- .0017	+ .08
8	.1697	9.29	17.94	6.06	+ .0003	+ .10
9	.1721	9.28	17.84	6.39	+ .0024	+ .10
10	.1744	9.27	17.74	6.72	+ .0041	+ .08
11	+ 0.1768	- 9.26	- 17.63	- 7.05	+ 0.0052	+ 0.05
12	.1792	9.25	17.52	7.38	+ .0054	+ .01
13	.1816	9.24	17.40	7.71	+ .0049	- .03
14	.1840	9.23	17.27	8.03	+ .0036	- .07
15	.1865	9.22	17.15	8.35	+ .0017	- .09
16	+ 0.1889	- 9.20	- 17.01	- 8.67	- 0.0004	- 0.10
17	.1914	9.19	16.87	8.98	- .0025	- .09
18	.1940	9.18	16.73	9.30	- .0043	- .06
19	.1965	9.17	16.58	9.61	- .0054	- .02
20	.1991	9.15	16.43	9.91	- .0057	+ .02
21	+ 0.2017	- 9.14	- 16.27	- 10.22	- 0.0049	+ 0.07
22	.2043	9.12	16.11	10.52	- .0034	+ .10
23	.2069	9.11	15.94	10.81	- .0012	+ .11
24	.2096	9.09	15.77	11.11	+ .0011	+ .10
25	.2123	9.08	15.60	11.40	+ .0029	+ .06
26	+ 0.2150	- 9.06	- 15.42	- 11.69	+ 0.0039	+ 0.01
27	.2177	9.05	15.23	11.97	+ .0038	- .04
28	.2205	9.03	15.05	12.25	+ .0026	- .09
29	.2233	9.02	14.85	12.53	+ .0007	- .11
30	.2261	9.00	14.66	12.80	- .0014	- .11
May 1	+ 0.2290	- 8.99	- 14.45	- 13.07	- 0.0032	- 0.08
2	.2319	8.97	14.25	13.33	- .0040	- .03
3	.2348	8.95	14.04	13.60	- .0038	+ .02
4	.2377	8.94	13.83	13.85	- .0026	+ .07
5	.2407	8.92	13.61	14.10	- .0007	+ .10
6	+ 0.2437	- 8.91	- 13.39	- 14.35	+ 0.0016	+ 0.10
7	.2467	8.89	13.16	14.60	+ .0035	+ .09
8	.2498	8.87	12.94	14.84	+ .0049	+ .06
9	.2528	8.86	12.71	15.07	+ .0055	+ .02
10	.2559	8.84	12.47	15.30	+ .0052	- .02
11	+ 0.2591	- 8.82	- 12.23	- 15.53	+ 0.0041	- 0.06
12	.2622	8.81	11.99	15.75	+ .0024	- .09
13	.2654	8.79	11.75	15.97	+ .0003	- .10
14	.2686	8.78	11.50	16.18	- .0018	- .09
15	.2719	8.76	11.25	16.39	- .0037	- .07
16	+ 0.2751	- 8.74	- 10.99	- 16.60	- 0.0050	- 0.04
17	+ 0.2784	- 8.73	- 10.73	- 16.80	- 0.0056	+ 0.01

Date.	A	B	C	D	A'	B'
May 17	+ 0.2784	- 8.73	- 10.73	- 16.80	- 0.0056	+ 0.01
18	.2817	8.71	10.47	16.99	- .0051	+ .05
19	.2851	8.70	10.21	17.18	- .0037	+ .09
20	.2885	8.69	9.94	17.37	- .0016	+ .11
21	.2918	8.67	9.67	17.55	+ .0007	+ .10
22	+ 0.2953	- 8.66	- 9.40	- 17.72	+ 0.0027	+ 0.07
23	.2987	8.64	9.13	17.89	+ .0040	+ .03
24	.3021	8.63	8.85	18.06	+ .0042	- .02
25	.3056	8.62	8.57	18.21	+ .0033	- .07
26	.3091	8.60	8.29	18.37	+ .0014	- .10
27	+ 0.3127	- 8.59	- 8.01	- 18.52	- 0.0008	- 0.11
28	.3162	8.58	7.72	18.66	- .0028	- .09
29	.3198	8.57	7.43	18.80	- .0040	- .05
30	.3234	8.56	7.14	18.93	- .0042	.00
31	.3270	8.55	6.85	19.06	- .0034	+ .05
June 1	+ 0.3306	- 8.54	- 6.56	- 19.18	- 0.0016	+ 0.09
2	.3342	8.53	6.26	19.30	+ .0006	+ .11
3	.3379	8.52	5.97	19.41	+ .0027	+ .10
4	.3415	8.51	5.67	19.52	+ .0044	+ .07
5	.3452	8.50	5.37	19.62	+ .0053	+ .03
6	+ 0.3489	- 8.49	- 5.07	- 19.71	+ 0.0053	- 0.01
7	.3526	8.48	4.76	19.80	+ .0044	- .05
8	.3564	8.48	4.46	19.88	+ .0029	- .08
9	.3601	8.47	4.16	19.96	+ .0009	- .10
10	.3638	8.47	3.85	20.04	- .0013	- .10
11	+ 0.3676	- 8.46	- 3.54	- 20.10	- 0.0033	- 0.08
12	.3714	8.46	3.23	20.17	- .0047	- .05
13	.3752	8.45	2.93	20.22	- .0055	.00
14	.3789	8.45	2.62	20.27	- .0054	+ .04
15	.3827	8.45	2.31	20.31	- .0042	+ .08
16	+ 0.3865	- 8.44	- 1.99	- 20.36	- 0.0023	+ 0.10
17	.3903	8.44	1.68	20.39	.0000	+ .11
18	.3941	8.44	1.37	20.42	+ .0023	+ .09
19	.3979	8.44	1.06	20.44	+ .0039	+ .04
20	.4018	8.44	0.75	20.46	+ .0045	- .01
21	+ 0.4056	- 8.44	- 0.43	- 20.46	+ 0.0040	- 0.06
22	.4094	8.44	- 0.12	20.47	+ .0022	- .10
23	.4132	8.44	+ 0.19	20.47	+ .0002	- .11
24	.4170	8.45	0.50	20.46	- .0019	- .10
25	.4208	8.45	0.82	20.45	- .0036	- .06
26	+ 0.4246	- 8.45	+ 1.13	- 20.43	- 0.0042	- 0.01
27	.4285	8.45	1.44	20.41	- .0039	+ .04
28	.4323	8.46	1.75	20.38	- .0023	+ .08
29	.4361	8.46	2.06	20.35	- .0002	+ .10
30	.4398	8.47	2.37	20.30	+ .0020	+ .10
July 1	+ 0.4436	- 8.48	+ 2.68	- 20.26	+ 0.0038	+ 0.08
2	+ 0.4474	- 8.48	+ 2.99	- 20.21	+ 0.0050	+ 0.05

Date.	A	B	C	D	A'	B'
July 1	+ 0.4436	- 8.48	+ 2.68	- 20.26	+ 0.0038	+ 0.08
2	.4474	8.48	2.99	20.21	+ .0050	+ .05
3	.4512	8.49	3.30	20.15	+ .0053	+ .01
4	.4549	8.50	3.61	20.09	+ .0047	- .04
5	.4587	8.51	3.91	20.02	+ .0033	- .07
6	+ 0.4624	- 8.52	+ 4.22	- 19.95	+ 0.0014	- 0.10
7	.4661	8.53	4.52	19.87	- .0007	- .10
8	.4698	8.54	4.82	19.78	- .0028	- .09
9	.4735	8.55	5.12	19.69	- .0045	- .06
10	.4772	8.56	5.42	19.60	- .0055	- .02
11	+ 0.4809	- 8.57	+ 5.72	- 19.50	- 0.0057	+ 0.03
12	.4846	8.58	6.02	19.39	- .0049	+ .07
13	.4882	8.59	6.32	19.28	- .0032	+ .10
14	.4918	8.61	6.61	19.16	- .0009	+ .11
15	.4954	8.62	6.90	19.04	+ .0014	+ .09
16	+ 0.4990	- 8.63	+ 7.19	- 18.91	+ 0.0034	+ 0.06
17	.5026	8.65	7.48	18.78	+ .0044	+ .01
18	.5061	8.66	7.76	18.64	+ .0044	- .04
19	.5096	8.68	8.05	18.50	+ .0032	- .09
20	.5132	8.69	8.33	18.34	+ .0012	- .11
21	+ 0.5166	- 8.71	+ 8.61	- 18.19	- 0.0010	- 0.11
22	.5201	8.72	8.89	18.03	- .0028	- .08
23	.5236	8.74	9.16	17.87	- .0038	- .03
24	.5270	8.75	9.43	17.70	- .0038	+ .02
25	.5304	8.77	9.70	17.53	- .0027	+ .07
26	+ 0.5337	- 8.79	+ 9.97	- 17.35	- 0.0008	+ 0.10
27	.5371	8.81	10.23	17.16	+ .0014	+ .11
28	.5404	8.82	10.49	16.97	+ .0034	+ .09
29	.5437	8.84	10.75	16.78	+ .0048	+ .06
30	.5470	8.86	11.01	16.58	+ .0053	+ .02
31	+ 0.5502	- 8.88	+ 11.26	- 16.38	+ 0.0050	- 0.02
Aug. 1	.5535	8.90	11.51	16.18	+ .0038	- .06
2	.5566	8.91	11.75	15.96	+ .0020	- .09
3	.5598	8.93	12.00	15.75	- .0001	- .10
4	.5630	8.95	12.24	15.53	- .0022	- .09
5	+ 0.5661	- 8.97	+ 12.47	- 15.30	- 0.0041	- 0.07
6	.5692	8.99	12.71	15.07	- .0054	- .03
7	.5722	9.01	12.94	14.84	- .0058	+ .01
8	.5753	9.03	13.16	14.60	- .0054	+ .05
9	.5783	9.05	13.38	14.36	- .0040	+ .09
10	+ 0.5813	- 9.06	+ 13.60	- 14.11	- 0.0020	+ 0.10
11	.5842	9.08	13.82	13.86	+ .0004	+ .10
12	.5871	9.10	14.03	13.61	+ .0025	+ .07
13	.5901	9.12	14.24	13.35	+ .0039	+ .03
14	.5929	9.14	14.44	13.09	+ .0042	- .03
15	+ 0.5958	- 9.16	+ 14.64	- 12.82	+ 0.0035	- 0.07
16	+ 0.5986	- 9.18	+ 14.84	- 12.55	+ 0.0019	- 0.10

Date.	A	B	C	D	A'	B'
Aug. 16	+ 0.5986	- 9.18	+ 14.84	- 12.55	+ 0.0019	- 0.10
17	.6014	9.20	15.02	12.28	- .0002	- .11
18	.6042	9.22	15.21	12.00	- .0022	- .09
19	.6069	9.23	15.40	11.72	- .0035	- .05
20	.6096	9.25	15.57	11.44	- .0037	+ .01
21	+ 0.6123	- 9.27	+ 15.75	- 11.15	- 0.0029	+ 0.05
22	.6150	9.29	15.92	10.86	- .0012	+ .09
23	.6176	9.30	16.08	10.57	+ .0010	+ .11
24	.6202	9.32	16.24	10.27	+ .0031	+ .10
25	.6228	9.34	16.40	9.97	+ .0047	+ .07
26	+ 0.6254	- 9.35	+ 16.55	- 9.67	+ 0.0055	+ 0.03
27	.6279	9.37	16.70	9.37	+ .0054	- .01
28	.6305	9.39	16.84	9.06	+ .0044	- .05
29	.6330	9.40	16.98	8.75	+ .0027	- .08
30	.6354	9.42	17.11	8.43	+ .0008	- .10
31	+ 0.6379	- 9.43	+ 17.24	- 8.12	- 0.0015	- 0.10
Sept. 1	.6403	9.44	17.36	7.80	- .0035	- .08
2	.6428	9.46	17.48	7.48	- .0049	- .04
3	.6452	9.47	17.60	7.16	- .0057	.00
4	.6476	9.48	17.71	6.83	- .0056	+ .04
5	+ 0.6499	- 9.50	+ 17.81	- 6.50	- 0.0046	+ 0.08
6	.6522	9.51	17.91	6.17	- .0028	+ .10
7	.6546	9.52	18.00	5.84	- .0006	+ .10
8	.6569	9.53	18.09	5.51	+ .0015	+ .08
9	.6592	9.54	18.17	5.18	+ .0032	+ .04
10	+ 0.6615	- 9.55	+ 18.25	- 4.84	+ 0.0039	- 0.01
11	.6638	9.56	18.32	4.50	+ .0035	- .06
12	.6660	9.57	18.39	4.16	+ .0021	- .10
13	.6683	9.57	18.45	3.82	+ .0001	- .11
14	.6705	9.58	18.51	3.48	- .0018	- .10
15	+ 0.6727	- 9.59	+ 18.56	- 3.13	- 0.0033	- 0.06
16	.6750	9.59	18.60	2.79	- .0038	- .01
17	.6772	9.60	18.65	2.44	- .0033	+ .04
18	.6794	9.61	18.68	2.10	- .0016	+ .08
19	.6816	9.61	18.71	1.75	+ .0003	+ .11
20	+ 0.6838	- 9.61	+ 18.74	- 1.40	+ 0.0027	+ 0.11
21	.6860	9.62	18.75	1.05	+ .0045	+ .08
22	.6882	9.62	18.77	0.70	+ .0056	+ .04
23	.6903	9.62	18.78	0.35	+ .0058	.00
24	.6925	9.62	18.78	0.00	+ .0050	- .04
25	+ 0.6947	- 9.62	+ 18.78	+ 0.35	+ 0.0035	- 0.08
26	.6969	9.62	18.77	0.70	+ .0015	- .10
27	.6991	9.62	18.75	1.05	- .0006	- .10
28	.7013	9.62	18.74	1.40	- .0027	- .08
29	.7035	9.62	18.71	1.75	- .0044	- .05
30	+ 0.7057	- 9.61	+ 18.68	+ 2.09	- 0.0054	- 0.01
Oct. 1	+ 0.7079	- 9.61	+ 18.65	+ 2.44	- 0.0055	+ 0.03

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Date.	A	B	C	D	A'	B'
Oct. 1	+ 0.7079	- 9.61	+ 18.65	+ 2.44	- 0.0055	+ 0.03
2	.7101	9.61	18.60	2.79	- .0048	+ .07
3	.7123	9.60	18.56	3.14	- .0033	+ .10
4	.7145	9.60	18.51	3.49	- .0013	+ .11
5	.7168	9.59	18.45	3.83	+ .0008	+ .09
6	+ 0.7190	- 9.59	+ 18.39	+ 4.18	+ 0.0026	+ 0.06
7	.7213	9.58	18.31	4.52	+ .0035	+ .01
8	.7236	9.57	18.24	4.86	+ .0034	- .04
9	.7259	9.56	18.16	5.21	+ .0022	- .09
10	.7282	9.55	18.08	5.55	+ .0004	- .11
11	+ 0.7305	- 9.54	+ 17.98	+ 5.89	- 0.0016	- 0.11
12	.7328	9.53	17.89	6.22	- .0033	- .08
13	.7352	9.52	17.79	6.56	- .0041	- .03
14	.7375	9.51	17.68	6.90	- .0038	+ .02
15	.7399	9.50	17.57	7.23	- .0024	+ .07
16	+ 0.7424	- 9.49	+ 17.45	+ 7.56	- 0.0003	+ 0.10
17	.7448	9.48	17.33	7.89	+ .0020	+ .11
18	.7472	9.46	17.20	8.21	+ .0041	+ .09
19	.7497	9.45	17.07	8.54	+ .0055	+ .06
20	.7522	9.43	16.93	8.86	+ .0060	+ .01
21	+ 0.7548	- 9.42	+ 16.79	+ 9.18	+ 0.0056	- 0.03
22	.7573	9.41	16.64	9.49	+ .0042	- .07
23	.7599	9.39	16.49	9.81	+ .0024	- .09
24	.7625	9.37	16.33	10.12	+ .0002	- .10
25	.7651	9.36	16.16	10.43	- .0019	- .09
26	+ 0.7677	- 9.34	+ 15.99	+ 10.73	- 0.0037	- 0.06
27	.7704	9.33	15.82	11.03	- .0049	- .03
28	.7731	9.31	15.64	11.33	- .0053	+ .02
29	.7759	9.29	15.46	11.63	- .0048	+ .06
30	.7786	9.27	15.27	11.92	- .0036	+ .09
31	+ 0.7814	- 9.26	+ 15.08	+ 12.21	- 0.0019	+ 0.11
Nov. 1	.7843	9.24	14.88	12.49	+ .0004	+ .10
2	.7871	9.22	14.68	12.77	+ .0022	+ .07
3	.7900	9.20	14.47	13.05	+ .0034	+ .02
4	.7929	9.18	14.26	13.32	+ .0035	- .03
5	+ 0.7959	- 9.17	+ 14.04	+ 13.59	+ 0.0026	- 0.07
6	.7989	9.15	13.82	13.86	+ .0009	- .11
7	.8019	9.13	13.60	14.12	- .0013	- .11
8	.8049	9.11	13.37	14.38	- .0032	- .09
9	.8080	9.09	13.13	14.63	- .0044	- .05
10	+ 0.8111	- 9.07	+ 12.90	+ 14.88	- 0.0044	+ 0.01
11	.8143	9.05	12.66	15.13	- .0034	+ .06
12	.8174	9.03	12.41	15.36	- .0014	+ .09
13	.8206	9.01	12.16	15.60	+ .0011	+ .11
14	.8239	9.00	11.91	15.83	+ .0034	+ .10
15	+ 0.8271	- 8.98	+ 11.65	+ 16.05	+ 0.0051	+ 0.07
16	+ 0.8304	- 8.96	+ 11.39	+ 16.28	+ 0.0059	+ 0.03

Date.	A	B	C	D	A'	B'
Nov 16	+ 0.8304	- 8.96	+ 11.39	+ 16.28	+ 0.0059	+ 0.03
17	.8338	8.94	11.12	16.49	+ .0058	- .02
18	.8371	8.92	10.86	16.70	+ .0048	- .06
19	.8405	8.90	10.59	16.91	+ .0031	- .09
20	.8439	8.89	10.31	17.11	+ .0010	- .10
21	+ 0.8474	- 8.87	+ 10.03	+ 17.31	- 0.0012	- 0.09
22	.8508	8.85	9.75	17.49	- .0031	- .07
23	.8544	8.84	9.46	17.68	- .0045	- .04
24	.8579	8.82	9.18	17.86	- .0051	.00
25	.8614	8.80	8.89	18.03	- .0049	+ .05
26	+ 0.8650	- 8.79	+ 8.59	+ 18.20	- 0.0038	+ 0.08
27	.8686	8.77	8.30	18.37	- .0021	+ .10
28	.8723	8.76	8.00	18.52	.0000	+ .10
29	.8760	8.74	7.70	18.67	+ .0020	+ .08
30	.8796	8.73	7.39	18.82	+ .0034	+ .04
Dec. 1	+ 0.8834	- 8.71	+ 7.09	+ 18.96	+ 0.0038	- 0.01
2	.8871	8.70	6.78	19.09	+ .0033	- .06
3	.8909	8.69	6.47	19.22	+ .0016	- .10
4	.8946	8.68	6.15	19.34	- .0006	- .11
5	.8984	8.67	5.84	19.46	- .0027	- .10
6	+ 0.9022	- 8.65	+ 5.52	+ 19.57	- 0.0042	- 0.06
7	.9061	8.64	5.20	19.67	- .0048	- .01
8	.9099	8.63	4.88	19.77	- .0041	+ .04
9	.9138	8.62	4.56	19.86	- .0025	+ .08
10	.9177	8.62	4.24	19.94	- .0001	+ .11
11	+ 0.9216	- 8.61	+ 3.91	+ 20.02	+ 0.0024	+ 0.10
12	.9255	8.60	3.58	20.10	+ .0044	+ .08
13	.9294	8.60	3.26	20.16	+ .0056	+ .04
14	.9334	8.59	2.93	20.22	+ .0058	.00
15	.9373	8.58	2.60	20.27	+ .0051	- .05
16	+ 0.9413	- 8.58	+ 2.27	+ 20.32	+ 0.0036	- 0.08
17	.9453	8.57	1.93	20.36	+ .0016	- .10
18	.9492	8.57	1.60	20.39	- .0006	- .10
19	.9532	8.57	1.27	20.42	- .0026	- .08
20	.9572	8.57	0.94	20.45	- .0041	- .05
21	+ 0.9612	- 8.56	+ 0.60	+ 20.46	- 0.0050	- 0.01
22	.9652	8.56	+ 0.27	20.47	- .0050	+ .03
23	.9691	8.56	- 0.06	20.47	- .0042	+ .07
24	.9731	8.56	0.40	20.46	- .0026	+ .10
25	.9771	8.56	0.73	20.46	- .0006	+ .10
26	+ 0.9811	- 8.57	- 1.07	+ 20.44	+ 0.0015	+ 0.09
27	.9851	8.57	1.40	20.41	+ .0032	+ .05
28	.9891	8.57	1.73	20.38	+ .0040	+ .01
29	.9931	8.58	2.06	20.35	+ .0038	- .04
30	0.9970	8.58	2.40	20.30	+ .0025	- .09
31	+ 1.0010	- 8.59	- 2.73	+ 20.25	+ 0.0005	- 0.11
32	+ 1.0049	- 8.59	- 3.06	+ 20.20	- 0.0017	- 0.11

Date.	<i>f</i>	<i>g</i>	log <i>g</i>	<i>G</i>	<i>h</i>	log <i>h</i>	<i>H</i>	<i>i</i>	log <i>i</i>
Jan. 1	—0·323	8·35	0·9216	17 01·8	20·43	1·3102	23 24·7	—1·36	0·134 _n
2	0·311	8·34	0·9210	17 03·9	20·41	1·3099	23 20·9	1·50	0·177 _n
3	0·299	8·33	0·9206	17 06·1	20·40	1·3097	23 17·1	1·65	0·216 _n
4	0·287	8·32	0·9203	17 08·3	20·39	1·3095	23 13·3	1·79	0·252 _n
5	0·275	8·32	0·9201	17 10·4	20·38	1·3092	23 09·6	1·93	0·285 _n
6	—0·263	8·31	0·9198	17 12·5	20·37	1·3089	23 05·8	—2·07	0·316 _n
7	0·251	8·31	0·9196	17 14·7	20·35	1·3086	23 02·1	2·21	0·344 _n
8	0·239	8·31	0·9194	17 16·9	20·33	1·3082	22 58·3	2·35	0·371 _n
9	0·227	8·31	0·9195	17 19·0	20·32	1·3079	22 54·5	2·49	0·396 _n
10	0·216	8·31	0·9196	17 21·1	20·30	1·3075	22 50·7	2·62	0·419 _n
11	—0·204	8·31	0·9197	17 23·3	20·28	1·3071	22 46·9	—2·76	0·441 _n
12	0·192	8·32	0·9190	17 25·4	20·26	1·3067	22 43·1	2·90	0·462 _n
13	0·181	8·32	0·9201	17 27·5	20·24	1·3063	22 39·3	3·03	0·482 _n
14	0·170	8·32	0·9204	17 29·6	20·22	1·3059	22 35·4	3·16	0·500 _n
15	0·158	8·33	0·9208	17 31·7	20·20	1·3054	22 31·5	3·30	0·518 _n
16	—0·147	8·34	0·9213	17 33·7	20·18	1·3049	22 27·7	—3·43	0·535 _n
17	0·136	8·35	0·9218	17 35·8	20·16	1·3044	22 23·9	3·56	0·551 _n
18	0·125	8·36	0·9223	17 37·8	20·13	1·3039	22 20·0	3·69	0·567 _n
19	0·114	8·38	0·9230	17 39·8	20·11	1·3034	22 16·1	3·82	0·582 _n
20	0·103	8·39	0·9237	17 41·8	20·09	1·3029	22 12·3	3·94	0·596 _n
21	—0·092	8·40	0·9244	17 43·8	20·06	1·3024	22 08·4	—4·07	0·6097 _n
22	0·081	8·42	0·9251	17 45·7	20·04	1·3018	22 04·5	4·20	0·6228 _n
23	0·071	8·43	0·9260	17 47·6	20·01	1·3012	22 00·6	4·32	0·6354 _n
24	0·060	8·45	0·9269	17 49·5	19·98	1·3006	21 56·7	4·44	0·6475 _n
25	0·049	8·47	0·9278	17 51·4	19·95	1·3000	21 52·7	4·56	0·6591 _n
26	—0·039	8·49	0·9287	17 53·3	19·93	1·2994	21 48·8	—4·68	0·6703 _n
27	0·029	8·51	0·9297	17 55·1	19·90	1·2988	21 44·9	4·80	0·6811 _n
28	0·018	8·53	0·9307	17 56·9	19·87	1·2982	21 40·9	4·92	0·6915 _n
29	—0·008	8·55	0·9318	17 58·7	19·84	1·2976	21 36·9	5·03	0·7015 _n
30	+0·002	8·57	0·9329	18 00·5	19·81	1·2970	21 33·0	5·14	0·7111 _n
31	+0·012	8·59	0·9340	18 02·2	19·78	1·2963	21 29·0	—5·25	0·7204 _n
Feb. 1	0·021	8·61	0·9352	18 03·9	19·75	1·2957	21 25·0	5·36	0·7293 _n
2	0·031	8·64	0·9364	18 05·5	19·72	1·2950	21 21·0	5·47	0·7380 _n
3	0·041	8·66	0·9376	18 07·2	19·70	1·2944	21 17·0	5·58	0·7463 _n
4	0·050	8·69	0·9388	18 08·9	19·67	1·2937	21 13·0	5·68	0·7544 _n
5	+0·060	8·71	0·9401	18 10·5	19·64	1·2931	21 08·9	—5·78	0·7621 _n
6	0·069	8·74	0·9413	18 12·0	19·61	1·2924	21 04·9	5·88	0·7696 _n
7	0·078	8·76	0·9426	18 13·5	19·58	1·2917	21 00·8	5·98	0·7768 _n
8	0·088	8·79	0·9438	18 15·1	19·55	1·2911	20 56·7	6·08	0·7838 _n
9	0·097	8·81	0·9450	18 16·6	19·52	1·2904	20 52·7	6·17	0·7905 _n
10	+0·106	8·84	0·9463	18 18·1	19·49	1·2897	20 48·6	—6·27	0·7970 _n
11	0·114	8·86	0·9477	18 19·5	19·46	1·2891	20 44·5	6·36	0·8033 _n
12	0·123	8·89	0·9490	18 20·9	19·43	1·2884	20 40·4	6·45	0·8093 _n
13	0·132	8·92	0·9502	18 22·3	19·40	1·2878	20 36·3	6·53	0·8151 _n
14	0·141	8·94	0·9515	18 23·7	19·37	1·2871	20 32·1	6·62	0·8207 _n
15	+0·149	8·97	0·9528	18 25·1	19·34	1·2865	20 27·9	—6·70	0·8261 _n
16	+0·158	9·00	0·9541	18 26·4	19·31	1·2859	20 23·8	—6·78	0·8313 _n

Date.	Sidereal Time.	τ	f'	g'	g'	G'	j	J
	^h		^s	^s	["]	^h		^h ^m
Jan. 1	6.6	-0.0009	-0.018	0.008	0.12	10.9	0.04	11 02
2	6.7	+0.0019	-0.014	0.008	.12	9.4	.04	11 04
3	6.8	0.0046	-0.008	0.008	.12	7.8	.04	11 06
4	6.8	.0073	.000	.007	.11	6.1	.04	11 08
5	6.9	.0101	+0.007	.007	.10	4.1	.04	11 10
6	7.0	0.0128	+0.013	0.006	0.10	1.9	0.04	11 13
7	7.0	.0155	+0.015	.007	.10	23.8	.04	11 15
8	7.1	.0183	+0.014	.007	.11	21.9	.04	11 17
9	7.2	.0210	+0.010	.008	.11	20.2	.04	11 19
10	7.2	.0238	+0.003	.008	.11	18.7	.04	11 21
11	7.3	0.0265	-0.004	0.007	0.10	17.1	0.04	11 23
12	7.4	.0292	-0.009	.006	.09	15.3	.04	11 25
13	7.4	.0320	-0.011	.005	.07	12.9	.04	11 28
14	7.5	.0347	-0.010	.005	.07	10.1	.04	11 30
15	7.6	.0374	-0.006	.006	.08	7.9	.04	11 32
16	7.6	0.0402	-0.001	0.007	0.10	6.2	0.04	11 34
17	7.7	.0429	+0.005	.007	.11	4.8	.04	11 36
18	7.8	.0457	+0.010	.007	.11	3.5	.04	11 38
19	7.8	.0484	+0.014	.007	.10	2.1	.04	11 40
20	7.9	.0511	+0.015	.007	.10	0.6	.04	11 42
21	8.0	0.0539	+0.013	0.006	0.09	22.8	0.04	11 44
22	8.0	.0566	+0.010	.006	.09	20.9	.04	11 46
23	8.1	.0594	+0.004	.006	.09	19.2	.04	11 48
24	8.2	.0621	-0.002	.007	.10	17.5	.04	11 50
25	8.2	.0648	-0.009	.007	.11	15.9	.04	11 51
26	8.3	0.0676	-0.015	0.008	0.12	14.3	0.04	11 53
27	8.4	.0703	-0.018	.008	.12	12.9	.04	11 55
28	8.4	.0730	-0.019	.008	.13	11.4	.04	11 57
29	8.5	.0758	-0.017	.008	.12	10.0	.04	11 59
30	8.6	.0785	-0.011	.008	.12	8.5	.04	12 00
31	8.6	0.0813	-0.004	0.007	0.11	6.9	0.04	12 02
Feb. 1	8.7	.0840	+0.004	.007	.10	5.0	.04	12 04
2	8.7	.0867	+0.010	.006	.09	2.9	.04	12 06
3	8.8	.0895	+0.014	.006	.09	0.5	.04	12 07
4	8.9	.0922	+0.014	.007	.10	22.3	.04	12 09
5	8.9	0.0949	+0.011	0.007	0.11	20.6	0.04	12 10
6	9.0	.0977	+0.005	.008	.11	19.1	.04	12 12
7	9.1	.1004	-0.001	.007	.11	17.7	.04	12 14
8	9.1	.1032	-0.007	.006	.09	16.0	.04	12 15
9	9.2	.1059	-0.010	.005	.07	13.8	.04	12 17
10	9.3	0.1086	-0.010	0.004	0.07	11.0	0.04	12 18
11	9.3	.1114	-0.007	.005	.08	8.3	.04	12 20
12	9.4	.1141	-0.002	.006	.09	6.5	.04	12 21
13	9.5	.1168	+0.004	.007	.11	5.0	.04	12 22
14	9.5	.1196	+0.010	.007	.11	3.7	.04	12 24
15	9.6	0.1223	+0.014	0.007	0.11	2.3	0.04	12 25
16	9.7	0.1251	+0.015	0.007	0.10	1.0	0.04	12 26

INDEPENDENT DAY NUMBERS, 1931.

Date.	<i>f</i>	<i>g</i>	log <i>g</i>	<i>G</i>	<i>h</i>	log <i>h</i>	<i>H</i>	<i>i</i>	log <i>i</i>
Feb. 16	+0.158	9.00	0.9541	18 26.4	19.31	1.2859	20 23.8	-6.78	0.8313 _n
17	0.166	9.02	0.9553	18 27.7	19.28	1.2852	20 19.6	6.86	0.8363 _n
18	0.174	9.05	0.9566	18 29.0	19.26	1.2846	20 15.5	6.94	0.8411 _n
19	0.182	9.08	0.9579	18 30.3	19.23	1.2840	20 11.3	7.01	0.8457 _n
20	0.190	9.10	0.9591	18 31.5	19.20	1.2834	20 07.1	7.08	0.8501 _n
21	+0.198	9.13	0.9603	18 32.7	19.18	1.2828	20 02.9	-7.15	0.8544 _n
22	0.206	9.15	0.9615	18 33.9	19.16	1.2823	19 58.7	7.22	0.8585 _n
23	0.214	9.18	0.9627	18 35.1	19.13	1.2817	19 54.4	7.29	0.8624 _n
24	0.222	9.20	0.9639	18 36.3	19.11	1.2812	19 50.2	7.35	0.8661 _n
25	0.229	9.23	0.9651	18 37.5	19.08	1.2806	19 45.9	7.41	0.8697 _n
26	+0.237	9.25	0.9663	18 38.6	19.06	1.2801	19 41.7	-7.47	0.8732 _n
27	0.244	9.28	0.9675	18 39.7	19.04	1.2796	19 37.4	7.52	0.8763 _n
28	0.252	9.30	0.9686	18 40.8	19.02	1.2791	19 33.1	7.58	0.8794 _n
Mar. 1	0.259	9.33	0.9697	18 41.9	19.00	1.2787	19 28.9	7.63	0.8823 _n
2	0.266	9.35	0.9707	18 43.0	18.98	1.2782	19 24.6	7.68	0.8851 _n
3	+0.274	9.37	0.9718	18 44.1	18.96	1.2778	19 20.3	-7.72	0.8877 _n
4	0.281	9.40	0.9729	18 45.2	18.94	1.2774	19 16.0	7.77	0.8902 _n
5	0.288	9.42	0.9739	18 46.2	18.92	1.2770	19 11.7	7.81	0.8925 _n
6	0.295	9.44	0.9749	18 47.3	18.91	1.2766	19 07.4	7.85	0.8947 _n
7	0.302	9.46	0.9758	18 48.3	18.89	1.2762	19 03.1	7.89	0.8968 _n
8	+0.309	9.48	0.9768	18 49.3	18.88	1.2759	18 58.8	-7.92	0.8987 _n
9	0.316	9.50	0.9777	18 50.3	18.86	1.2756	18 54.5	7.95	0.9004 _n
10	0.323	9.52	0.9786	18 51.3	18.85	1.2753	18 50.2	7.98	0.9020 _n
11	0.330	9.54	0.9795	18 52.3	18.84	1.2751	18 45.9	8.01	0.9035 _n
12	0.338	9.56	0.9804	18 53.3	18.83	1.2748	18 41.5	8.03	0.9048 _n
13	+0.344	9.58	0.9812	18 54.3	18.82	1.2746	18 37.2	-8.05	0.9060 _n
14	0.350	9.59	0.9820	18 55.3	18.81	1.2744	18 32.9	8.07	0.9071 _n
15	0.357	9.61	0.9827	18 56.3	18.80	1.2742	18 28.5	8.09	0.9080 _n
16	0.364	9.63	0.9835	18 57.3	18.80	1.2741	18 24.2	8.11	0.9088 _n
17	0.371	9.65	0.9843	18 58.3	18.79	1.2739	18 19.9	8.12	0.9095 _n
18	+0.377	9.66	0.9850	18 59.2	18.78	1.2738	18 15.5	-8.13	0.9101 _n
19	0.384	9.67	0.9856	19 00.2	18.78	1.2738	18 11.2	8.14	0.9105 _n
20	0.391	9.69	0.9863	19 01.2	18.78	1.2737	18 06.9	8.14	0.9107 _n
21	0.397	9.71	0.9870	19 02.1	18.78	1.2737	18 02.5	8.15	0.9109 _n
22	0.404	9.72	0.9876	19 03.1	18.78	1.2737	17 58.2	8.15	0.9109 _n
23	+0.411	9.73	0.9881	19 04.1	18.78	1.2737	17 53.9	-8.14	0.9108 _n
24	0.417	9.74	0.9887	19 05.1	18.78	1.2738	17 49.5	8.14	0.9105 _n
25	0.424	9.76	0.9893	19 06.1	18.78	1.2738	17 45.2	8.13	0.9101 _n
26	0.431	9.77	0.9898	19 07.1	18.79	1.2739	17 40.9	8.12	0.9096 _n
27	0.438	9.78	0.9903	19 08.1	18.79	1.2740	17 36.6	8.11	0.9090 _n
28	+0.444	9.79	0.9908	19 09.1	18.80	1.2742	17 32.3	-8.09	0.9082 _n
29	0.451	9.80	0.9913	19 10.1	18.81	1.2743	17 28.0	8.08	0.9073 _n
30	0.458	9.81	0.9918	19 11.1	18.81	1.2745	17 23.7	8.06	0.9063 _n
31	0.465	9.82	0.9922	19 12.1	18.82	1.2747	17 19.4	8.04	0.9051 _n
Apr. 1	0.472	9.83	0.9926	19 13.1	18.84	1.2750	17 15.1	8.01	0.9038 _n
2	+0.478	9.84	0.9931	19 14.1	18.85	1.2752	17 10.9	-7.99	0.9024 _n
3	+0.485	9.85	0.9935	19 15.1	18.86	1.2755	17 06.6	-7.96	0.9008 _n

Date.	Sidereal Time.	τ	f'	g'	g'	G'	j	J
Feb. 16	^h 9.7	0.1251	^s +0.015	^s 0.007	^s 0.10	^h 1.0	0.04	^h 12 26
17	9.7	.1278	+ .015	.006	.10	23.3	.04	12 28
18	9.8	.1305	+ .012	.006	.09	21.6	.04	12 29
19	9.9	.1333	+ .006	.006	.09	19.8	.04	12 30
20	9.9	.1360	.000	.007	.10	18.1	.04	12 32
21	10.0	0.1388	-0.007	0.007	0.11	16.4	0.04	12 33
22	10.1	.1415	- .013	.007	.11	14.9	.04	12 34
23	10.1	.1442	- .017	.008	.12	13.3	.04	12 35
24	10.2	.1470	- .019	.008	.12	11.9	.04	12 36
25	10.3	.1497	- .018	.008	.13	10.5	.04	12 37
26	10.3	0.1524	-0.014	0.008	0.13	9.1	0.04	12 39
27	10.4	.1552	- .007	.008	.12	7.6	.04	12 40
28	10.5	.1579	.000	.007	.10	5.9	.04	12 41
Mar. 1	10.5	.1607	+ .007	.006	.09	3.9	.04	12 42
2	10.6	.1634	+ .012	.005	.08	1.4	.04	12 43
3	10.7	0.1661	+0.013	0.005	0.09	22.9	0.04	12 44
4	10.7	.1689	+ .011	.007	.10	20.9	.04	12 45
5	10.8	.1716	+ .006	.007	.11	19.4	.04	12 46
6	10.9	.1743	.000	.007	.11	18.0	.04	12 47
7	10.9	.1771	- .005	.007	.10	16.5	.04	12 48
8	11.0	0.1798	-0.009	0.005	0.08	14.5	0.04	12 49
9	11.0	.1826	- .010	.005	.07	11.9	.04	12 50
10	11.1	.1853	- .008	.005	.07	9.1	.04	12 51
11	11.2	.1880	- .003	.005	.09	6.9	.04	12 52
12	11.2	.1908	+ .003	.007	.11	5.3	.04	12 53
13	11.3	0.1935	+0.009	0.008	0.12	3.9	0.04	12 54
14	11.4	.1962	+ .014	.008	.11	2.7	.04	12 55
15	11.4	.1990	+ .016	.007	.11	1.4	.04	12 56
16	11.5	.2017	+ .016	.007	.10	23.9	.04	12 57
17	11.6	.2045	+ .014	.007	.10	22.2	.04	12 58
18	11.6	0.2072	+0.009	0.006	0.10	20.4	0.04	12 59
19	11.7	.2099	+ .003	.007	.10	18.7	.04	13 00
20	11.8	.2127	- .004	.007	.10	17.1	.04	13 01
21	11.8	.2154	- .010	.007	.11	15.4	.04	13 02
22	11.9	.2182	- .015	.007	.11	13.9	.04	13 03
23	12.0	0.2209	-0.018	0.008	0.12	12.3	0.04	13 04
24	12.0	.2236	- .018	.008	.12	10.9	.04	13 05
25	12.1	.2264	- .015	.008	.12	9.5	.04	13 06
26	12.2	.2291	- .009	.008	.12	8.0	.04	13 07
27	12.2	.2318	- .002	.007	.11	6.5	.04	13 08
28	12.3	0.2346	+0.005	0.006	0.09	4.7	0.04	13 09
29	12.4	.2373	+ .010	.005	.08	2.3	.04	13 10
30	12.4	.2401	+ .012	.005	.08	23.7	.04	13 11
31	12.5	.2428	+ .011	.006	.09	21.4	.04	13 12
Apr. 1	12.6	.2455	+ .007	.007	.10	19.6	.04	13 13
2	12.6	0.2483	+0.001	0.007	0.11	18.1	0.04	13 14
3	12.7	0.2510	-0.005	0.007	0.11	16.7	0.04	13 15

INDEPENDENT DAY NUMBERS, 1931.

Date.	<i>f</i>	<i>g</i>	log <i>g</i>	<i>G</i>	<i>h</i>	log <i>h</i>	<i>H</i>	<i>i</i>	log <i>i</i>
Apr. 1	+0.472	9.83	0.9926	19 13.1	18.84	1.2750	17 15.1	-8.01	0.9038 _n
2	0.478	9.84	0.9931	19 14.1	18.85	1.2752	17 10.9	7.99	0.9024 _n
3	0.485	9.85	0.9935	19 15.1	18.86	1.2755	17 06.6	7.96	0.9008 _n
4	0.492	9.86	0.9939	19 16.2	18.87	1.2758	17 02.3	7.93	0.8991 _n
5	0.499	9.87	0.9943	19 17.3	18.88	1.2761	16 58.1	7.89	0.8973 _n
6	+0.506	9.88	0.9947	19 18.3	18.90	1.2765	16 53.8	-7.86	0.8953 _n
7	0.513	9.89	0.9950	19 19.4	18.92	1.2769	16 49.6	7.82	0.8932 _n
8	0.520	9.89	0.9953	19 20.5	18.93	1.2772	16 45.4	7.78	0.8910 _n
9	0.528	9.90	0.9957	19 21.6	18.95	1.2776	16 41.2	7.74	0.8886 _n
10	0.535	9.91	0.9961	19 22.7	18.97	1.2780	16 37.0	7.69	0.8861 _n
11	+0.542	9.92	0.9964	19 23.8	18.99	1.2785	16 32.8	-7.65	0.8835 _n
12	0.550	9.92	0.9967	19 24.9	19.01	1.2789	16 28.6	7.60	0.8807 _n
13	0.557	9.93	0.9970	19 26.0	19.03	1.2794	16 24.4	7.55	0.8777 _n
14	0.564	9.94	0.9974	19 27.1	19.05	1.2799	16 20.3	7.49	0.8746 _n
15	0.572	9.95	0.9977	19 28.3	19.07	1.2804	16 16.1	7.44	0.8714 _n
16	+0.580	9.95	0.9980	19 29.5	19.09	1.2809	16 12.0	-7.38	0.8680 _n
17	0.587	9.96	0.9983	19 30.6	19.12	1.2814	16 07.9	7.32	0.8644 _n
18	0.595	9.97	0.9986	19 31.8	19.14	1.2820	16 03.8	7.26	0.8607 _n
19	0.603	9.98	0.9990	19 33.0	19.16	1.2825	15 59.7	7.19	0.8569 _n
20	0.611	9.99	0.9994	19 34.2	19.19	1.2831	15 55.6	7.13	0.8529 _n
21	+0.619	9.99	0.9997	19 35.5	19.21	1.2836	15 51.5	-7.06	0.8487 _n
22	0.627	10.00	1.0000	19 36.7	19.24	1.2842	15 47.5	6.99	0.8443 _n
23	0.635	10.01	1.0004	19 37.9	19.27	1.2848	15 43.4	6.92	0.8398 _n
24	0.643	10.02	1.0008	19 39.1	19.29	1.2854	15 39.4	6.84	0.8351 _n
25	0.651	10.03	1.0012	19 40.4	19.32	1.2860	15 35.3	6.77	0.8303 _n
26	+0.660	10.04	1.0016	19 41.7	19.35	1.2866	15 31.3	-6.69	0.8252 _n
27	0.668	10.05	1.0020	19 43.0	19.37	1.2872	15 27.3	6.61	0.8200 _n
28	0.677	10.06	1.0025	19 44.3	19.40	1.2879	15 23.3	6.53	0.8146 _n
29	0.685	10.07	1.0030	19 45.6	19.43	1.2885	15 19.4	6.44	0.8090 _n
30	0.694	10.08	1.0034	19 46.9	19.46	1.2891	15 15.5	6.36	0.8032 _n
May 1	+0.703	10.09	1.0039	19 48.2	19.49	1.2897	15 11.5	-6.27	0.7972 _n
2	0.712	10.10	1.0045	19 49.6	19.51	1.2904	15 07.6	6.18	0.7910 _n
3	0.720	10.12	1.0050	19 50.9	19.54	1.2910	15 03.7	6.09	0.7846 _n
4	0.729	10.13	1.0055	19 52.3	19.57	1.2916	14 59.8	6.00	0.7779 _n
5	0.739	10.14	1.0061	19 53.6	19.60	1.2923	14 55.9	5.90	0.7711 _n
6	+0.748	10.16	1.0067	19 55.0	19.63	1.2929	14 52.1	-5.81	0.7640 _n
7	0.757	10.17	1.0074	19 56.3	19.66	1.2935	14 48.2	5.71	0.7566 _n
8	0.766	10.19	1.0081	19 57.7	19.68	1.2941	14 44.3	5.61	0.7491 _n
9	0.776	10.20	1.0088	19 59.1	19.71	1.2948	14 40.5	5.51	0.7412 _n
10	0.785	10.22	1.0095	20 00.5	19.74	1.2954	14 36.7	5.41	0.7331 _n
11	+0.795	10.24	1.0103	20 01.9	19.77	1.2960	14 32.9	-5.31	0.7247 _n
12	0.805	10.26	1.0111	20 03.3	19.80	1.2966	14 29.1	5.20	0.7160 _n
13	0.815	10.28	1.0119	20 04.7	19.82	1.2972	14 25.3	5.09	0.7071 _n
14	0.824	10.30	1.0127	20 06.1	19.85	1.2978	14 21.5	4.99	0.6978 _n
15	0.834	10.32	1.0135	20 07.5	19.88	1.2984	14 17.8	4.88	0.6882 _n
16	+0.844	10.34	1.0144	20 08.9	19.91	1.2990	14 14.1	-4.77	0.6782 _n
17	+0.855	10.36	1.0154	20 10.3	19.93	1.2996	14 10.3	-4.65	0.6679 _n

Date.	Sidereal Time.	τ	f'	g'	g'	G'	j	J
Apr.	^h 12 ^h 6	0 ^s 2455	+0 ^s 007	0 ^s 007	0 ^s 10	19 ^h 6	0 ^s 04	^{h m} 13 13
	2 12 ^h 6	2483	+ 001	007	11	18 ^h 1	04	13 14
	3 12 ^h 7	2510	- 005	007	11	16 ^h 7	04	13 15
	4 12 ^h 8	2537	- 010	006	09	15 ^h 1	04	13 16
	5 12 ^h 8	2565	- 011	005	08	12 ^h 7	04	13 17
	6 12 ^h 9	0 ^s 2592	-0 ^s 010	0 ^s 005	0 ^s 07	10 ^h 0	0 ^s 04	13 18
	7 13 ^h 0	2620	- 005	006	09	7 ^h 6	04	13 19
	8 13 ^h 0	2647	+ 001	007	10	5 ^h 8	04	13 20
	9 13 ^h 1	2674	+ 007	007	11	4 ^h 3	04	13 22
	10 13 ^h 2	2702	+ 013	008	12	3 ^h 0	04	13 23
	11 13 ^h 2	0 ^s 2729	+0 ^s 016	0 ^s 008	0 ^s 11	1 ^h 7	0 ^s 04	13 24
	12 13 ^h 3	2756	+ 017	007	11	0 ^h 3	04	13 25
	13 13 ^h 3	2784	+ 015	007	10	22 ^h 7	04	13 26
	14 13 ^h 4	2811	+ 011	007	10	21 ^h 1	04	13 27
	15 13 ^h 5	2839	+ 005	007	10	19 ^h 4	04	13 28
	16 13 ^h 5	0 ^s 2866	-0 ^s 001	0 ^s 007	0 ^s 10	17 ^h 7	0 ^s 04	13 29
	17 13 ^h 6	2893	- 008	007	10	16 ^h 0	04	13 31
	18 13 ^h 7	2921	- 013	007	11	14 ^h 4	04	13 32
	19 13 ^h 7	2948	- 017	007	11	12 ^h 8	04	13 33
	20 13 ^h 8	2976	- 017	008	12	11 ^h 3	04	13 34
	21 13 ^h 9	0 ^s 3003	-0 ^s 015	0 ^s 008	0 ^s 12	9 ^h 7	0 ^s 04	13 35
	22 13 ^h 9	3030	- 010	008	12	8 ^h 3	04	13 37
	23 14 ^h 0	3058	- 004	008	11	6 ^h 8	04	13 38
	24 14 ^h 1	3085	+ 003	007	10	5 ^h 1	04	13 39
	25 14 ^h 1	3112	+ 009	006	09	3 ^h 1	04	13 40
	26 14 ^h 2	0 ^s 3140	+0 ^s 012	0 ^s 005	0 ^s 08	0 ^h 6	0 ^s 04	13 42
	27 14 ^h 3	3167	+ 012	006	09	22 ^h 1	04	13 43
	28 14 ^h 3	3195	+ 008	007	10	20 ^h 1	04	13 44
	29 14 ^h 4	3222	+ 002	007	11	18 ^h 5	04	13 46
	30 14 ^h 5	3249	- 004	007	11	17 ^h 0	04	13 47
May	1 14 ^h 5	0 ^s 3277	-0 ^s 010	0 ^s 007	0 ^s 10	15 ^h 4	0 ^s 04	13 48
	2 14 ^h 6	3304	- 012	006	09	13 ^h 5	04	13 50
	3 14 ^h 7	3331	- 012	005	08	11 ^h 1	04	13 51
	4 14 ^h 7	3359	- 008	006	08	8 ^h 5	04	13 52
	5 14 ^h 8	3386	- 002	006	10	6 ^h 5	04	13 54
	6 14 ^h 9	0 ^s 3414	+0 ^s 005	0 ^s 007	0 ^s 11	4 ^h 9	0 ^s 04	13 55
	7 14 ^h 9	3441	+ 011	008	12	3 ^h 5	04	13 56
	8 15 ^h 0	3468	+ 015	008	12	2 ^h 1	04	13 58
	9 15 ^h 1	3496	+ 017	008	11	0 ^h 7	04	13 59
	10 15 ^h 1	3523	+ 016	007	11	23 ^h 3	04	14 00
	11 15 ^h 2	0 ^s 3550	+0 ^s 013	0 ^s 007	0 ^s 10	21 ^h 6	0 ^s 04	14 02
	12 15 ^h 3	3578	+ 007	007	10	19 ^h 9	04	14 03
	13 15 ^h 3	3605	+ 001	007	10	18 ^h 2	04	14 05
	14 15 ^h 4	3633	- 006	007	10	16 ^h 6	04	14 06
	15 15 ^h 5	3660	- 011	007	10	15 ^h 0	05	14 08
	16 15 ^h 5	0 ^s 3687	-0 ^s 015	0 ^s 007	0 ^s 11	13 ^h 3	0 ^s 05	14 09
	17 15 ^h 6	0 ^s 3715	-0 ^s 017	0 ^s 007	0 ^s 11	11 ^h 7	0 ^s 05	14 10

Date.	<i>f</i>	<i>g</i>	log <i>g</i>	<i>G</i>	<i>h</i>	log <i>h</i>	<i>H</i>	<i>i</i>	log <i>i</i>
	^s	["]		^h ^m	["]		^h ^m	["]	
May 17	+0.855	10.36	1.0154	20 10.3	19.93	1.2996	14 10.3	-4.65	0.6679 _n
18	0.865	10.38	1.0164	20 11.8	19.96	1.3002	14 06.6	4.54	0.6572 _n
19	0.875	10.41	1.0174	20 13.2	19.98	1.3007	14 02.9	4.43	0.6462 _n
20	0.885	10.43	1.0184	20 14.6	20.01	1.3013	13 59.2	4.31	0.6347 _n
21	0.896	10.46	1.0195	20 16.0	20.04	1.3018	13 55.5	4.20	0.6228 _n
22	+0.906	10.49	1.0206	20 17.4	20.06	1.3023	13 51.8	-4.08	0.610 _n
23	0.917	10.51	1.0218	20 18.8	20.08	1.3028	13 48.1	3.96	0.597 _n
24	0.927	10.54	1.0230	20 20.3	20.10	1.3033	13 44.5	3.84	0.584 _n
25	0.938	10.57	1.0242	20 21.7	20.13	1.3038	13 40.8	3.72	0.570 _n
26	0.949	10.60	1.0255	20 23.1	20.15	1.3043	13 37.1	3.60	0.556 _n
27	+0.960	10.64	1.0268	20 24.5	20.17	1.3048	13 33.5	-3.48	0.541 _n
28	0.971	10.67	1.0281	20 25.8	20.19	1.3052	13 29.9	3.35	0.525 _n
29	0.982	10.70	1.0294	20 27.2	20.22	1.3057	13 26.3	3.22	0.508 _n
30	0.993	10.73	1.0308	20 28.6	20.23	1.3061	13 22.7	3.10	0.491 _n
31	1.004	10.77	1.0322	20 29.9	20.25	1.3065	13 19.1	2.97	0.473 _n
June 1	+1.015	10.81	1.0337	20 31.3	20.27	1.3069	13 15.5	-2.84	0.454 _n
2	1.026	10.84	1.0351	20 32.7	20.29	1.3072	13 11.9	2.72	0.434 _n
3	1.037	10.88	1.0366	20 34.0	20.30	1.3076	13 08.3	2.59	0.413 _n
4	1.049	10.92	1.0382	20 35.3	20.32	1.3079	13 04.8	2.46	0.391 _n
5	1.060	10.96	1.0398	20 36.6	20.34	1.3083	13 01.2	2.33	0.367 _n
6	+1.072	11.00	1.0414	20 37.9	20.35	1.3086	12 57.7	-2.20	0.342 _n
7	1.084	11.04	1.0431	20 39.2	20.37	1.3089	12 54.1	2.07	0.315 _n
8	1.095	11.09	1.0448	20 40.5	20.38	1.3092	12 50.5	1.94	0.287 _n
9	1.107	11.13	1.0465	20 41.7	20.39	1.3094	12 47.0	1.80	0.256 _n
10	1.118	11.17	1.0482	20 42.9	20.40	1.3097	12 43.5	1.67	0.223 _n
11	+1.129	11.22	1.0499	20 44.2	20.41	1.3099	12 40.0	-1.54	0.187 _n
12	1.141	11.26	1.0517	20 45.4	20.42	1.3101	12 36.5	1.40	0.147 _n
13	1.153	11.31	1.0535	20 46.6	20.43	1.3103	12 32.9	1.27	0.103 _n
14	1.164	11.36	1.0554	20 47.8	20.44	1.3104	12 29.4	1.14	0.055 _n
15	1.176	11.41	1.0572	20 49.0	20.45	1.3106	12 25.9	1.00	0.000 _n
16	+1.188	11.46	1.0591	20 50.2	20.45	1.3107	12 22.4	-0.86	9.937 _n
17	1.199	11.51	1.0611	20 51.3	20.46	1.3108	12 18.9	0.73	9.863 _n
18	1.211	11.56	1.0630	20 52.4	20.46	1.3109	12 15.4	0.59	9.774 _n
19	1.223	11.61	1.0649	20 53.5	20.46	1.3110	12 11.9	0.46	9.662 _n
20	1.234	11.67	1.0669	20 54.6	20.47	1.3111	12 08.3	0.32	9.510 _n
21	+1.246	11.72	1.0689	20 55.7	20.47	1.3111	12 04.8	-0.19	9.274 _n
22	1.258	11.77	1.0709	20 56.7	20.47	1.3111	12 01.3	-0.05	8.719 _n
23	1.270	11.83	1.0729	20 57.8	20.47	1.3111	11 57.8	+0.08	8.921
24	1.281	11.88	1.0749	20 58.9	20.47	1.3111	11 54.3	0.22	9.340
25	1.293	11.94	1.0770	20 59.9	20.47	1.3111	11 50.8	0.35	9.549
26	+1.305	11.99	1.0790	21 00.8	20.46	1.3110	11 47.3	+0.49	9.690
27	1.317	12.05	1.0810	21 01.8	20.46	1.3109	11 43.8	0.63	9.796
28	1.328	12.11	1.0831	21 02.7	20.46	1.3108	11 40.3	0.76	9.881
29	1.340	12.17	1.0852	21 03.7	20.45	1.3107	11 36.8	0.90	9.952
30	1.352	12.23	1.0873	21 04.6	20.45	1.3106	11 33.3	1.03	0.013
July 1	+1.363	12.29	1.0894	21 05.5	20.44	1.3104	11 29.8	+1.16	0.066
2	+1.375	12.34	1.0914	21 06.4	20.43	1.3102	11 26.3	+1.30	0.113

Date.	Sidereal Time.	τ	f'	g'	g'	G'	j	J
	^h		^s	^s	["]	^h		^h ^m
May 17	15.6	0.3715	-0.017	0.007	0.11	11.7	0.05	14 19
18	15.6	.3742	- .016	.008	.11	10.2	.05	14 12
19	15.7	.3769	- .011	.008	.12	8.6	.05	14 13
20	15.8	.3797	- .005	.008	.11	7.1	.05	14 15
21	15.8	.3824	+ .002	.007	.10	5.5	.05	14 16
22	15.9	0.3852	+0.008	0.006	0.09	3.6	0.05	14 17
23	16.0	.3879	+ .012	.006	.09	1.3	.05	14 19
24	16.0	.3906	+ .013	.006	.09	22.9	.05	14 20
25	16.1	.3934	+ .010	.007	.10	20.7	.05	14 22
26	16.2	.3961	+ .004	.007	.11	19.1	.05	14 23
27	16.2	0.3989	-0.002	0.007	0.11	17.5	0.05	14 24
28	16.3	.4016	- .009	.007	.11	15.9	.05	14 26
29	16.4	.4043	- .012	.006	.09	14.1	.05	14 27
30	16.4	.4071	- .013	.006	.09	11.9	.05	14 29
31	16.5	.4098	- .010	.006	.09	9.5	.05	14 30
June 1	16.6	0.4125	-0.005	0.006	0.09	7.3	0.05	14 31
2	16.6	.4153	+ .002	.007	.11	5.6	.05	14 33
3	16.7	.4180	+ .008	.008	.11	4.1	.05	14 34
4	16.8	.4208	+ .014	.008	.11	2.6	.05	14 35
5	16.8	.4235	+ .016	.007	.11	1.2	.05	14 37
6	16.9	0.4262	+0.016	0.007	0.11	23.7	0.05	14 38
7	17.0	.4290	+ .014	.007	.10	22.1	.05	14 39
8	17.0	.4317	+ .009	.007	.10	20.4	.05	14 41
9	17.1	.4344	+ .003	.007	.10	18.7	.05	14 42
10	17.2	.4372	- .004	.007	.10	17.0	.05	14 43
11	17.2	0.4399	-0.010	0.007	0.10	15.4	0.05	14 44
12	17.3	.4427	- .015	.007	.11	13.8	.05	14 45
13	17.4	.4454	- .017	.007	.11	12.1	.05	14 47
14	17.4	.4481	- .016	.008	.11	10.7	.05	14 48
15	17.5	.4509	- .013	.008	.12	9.1	.05	14 49
16	17.6	0.4536	-0.007	0.008	0.11	7.6	0.05	14 50
17	17.6	.4563	.000	.007	.11	6.0	.05	14 51
18	17.7	.4591	+ .007	.006	.10	4.2	.05	14 52
19	17.8	.4618	+ .012	.006	.09	2.0	.05	14 54
20	17.8	.4646	+ .014	.006	.09	23.7	.05	14 55
21	17.9	0.4673	+0.012	0.007	0.10	21.5	0.05	14 56
22	17.9	.4700	+ .007	.007	.11	19.7	.05	14 57
23	18.0	.4728	+ .001	.007	.11	18.1	.05	14 58
24	18.1	.4755	- .006	.007	.11	16.5	.05	14 59
25	18.1	.4783	- .011	.006	.10	14.8	.05	15 00
26	18.2	0.4810	-0.013	0.006	0.09	12.7	0.05	15 01
27	18.3	.4837	- .012	.006	.08	10.3	.05	15 02
28	18.3	.4865	- .007	.006	.09	8.0	.05	15 03
29	18.4	.4892	- .001	.007	.10	6.1	.05	15 04
30	18.5	.4919	+ .006	.007	.11	4.6	.05	15 05
July 1	18.5	0.4947	+0.012	0.008	0.11	3.1	0.05	15 05
2	18.6	0.4974	+0.015	0.007	0.11	1.7	0.05	15 06

Date.	<i>f</i>	<i>g</i>	log <i>g</i>	<i>G</i>	<i>h</i>	log <i>h</i>	<i>H</i>	<i>i</i>	log <i>i</i>
July 1	^s +1.363	[#] 12.29	1.0894	^h ^m 21 05.5	20.44	1.3104	^h ^m 11 29.8	+1.16	0.066
2	1.375	12.34	1.0914	21 06.4	20.43	1.3102	11 26.3	1.30	0.113
3	1.386	12.40	1.0935	21 07.3	20.42	1.3101	11 22.8	1.43	0.156
4	1.398	12.46	1.0956	21 08.1	20.41	1.3098	11 19.3	1.56	0.194
5	1.409	12.53	1.0978	21 08.9	20.40	1.3096	11 15.8	1.70	0.230
6	+1.421	12.59	1.0999	21 09.7	20.39	1.3094	11 12.3	+1.83	0.262
7	1.432	12.65	1.1020	21 10.5	20.38	1.3091	11 08.7	1.96	0.293
8	1.444	12.71	1.1041	21 11.3	20.36	1.3088	11 05.2	2.09	0.321
9	1.455	12.77	1.1062	21 12.0	20.35	1.3085	11 01.7	2.22	0.347
10	1.466	12.83	1.1083	21 12.7	20.33	1.3082	10 58.1	2.35	0.372
11	+1.478	12.90	1.1105	21 13.5	20.32	1.3079	10 54.5	+2.48	0.395
12	1.489	12.96	1.1127	21 14.2	20.30	1.3076	10 51.0	2.61	0.417
13	1.500	13.02	1.1147	21 14.9	20.29	1.3072	10 47.5	2.74	0.438
14	1.511	13.09	1.1168	21 15.5	20.27	1.3068	10 43.9	2.86	0.457
15	1.522	13.15	1.1189	21 16.2	20.25	1.3064	10 40.3	2.99	0.476
16	+1.533	13.21	1.1210	21 16.8	20.23	1.3060	10 36.7	+3.12	0.494
17	1.544	13.28	1.1231	21 17.5	20.21	1.3056	10 33.1	3.24	0.511
18	1.555	13.34	1.1251	21 18.1	20.19	1.3052	10 29.5	3.37	0.527
19	1.566	13.40	1.1272	21 18.7	20.17	1.3047	10 25.9	3.49	0.543
20	1.577	13.46	1.1292	21 19.3	20.15	1.3042	10 22.3	3.61	0.558
21	+1.588	13.53	1.1313	21 19.8	20.13	1.3038	10 18.7	+3.73	0.572
22	1.598	13.59	1.1333	21 20.3	20.10	1.3033	10 15.1	3.85	0.586
23	1.609	13.66	1.1353	21 20.9	20.08	1.3028	10 11.5	3.97	0.599
24	1.619	13.72	1.1373	21 21.4	20.06	1.3023	10 07.8	4.09	0.612
25	1.630	13.78	1.1393	21 21.9	20.03	1.3017	10 04.1	4.21	0.624
26	+1.640	13.85	1.1413	21 22.4	20.01	1.3012	10 00.5	+4.32	0.6358
27	1.650	13.91	1.1433	21 22.9	19.98	1.3007	9 56.8	4.44	0.6472
28	1.661	13.97	1.1452	21 23.3	19.96	1.3001	9 53.1	4.55	0.6581
29	1.671	14.03	1.1472	21 23.8	19.93	1.2995	9 49.4	4.66	0.6687
30	1.681	14.10	1.1491	21 24.3	19.91	1.2990	9 45.7	4.77	0.6789
31	+1.691	14.16	1.1510	21 24.7	19.88	1.2984	9 42.0	+4.88	0.6887
Aug. 1	1.701	14.22	1.1529	21 25.1	19.85	1.2978	9 38.3	4.99	0.6982
2	1.711	14.28	1.1548	21 25.5	19.82	1.2972	9 34.5	5.10	0.7074
3	1.720	14.34	1.1566	21 25.9	19.80	1.2966	9 30.8	5.20	0.7163
4	1.730	14.40	1.1585	21 26.3	19.77	1.2960	9 27.1	5.31	0.7249
5	+1.740	14.46	1.1603	21 26.7	19.74	1.2954	9 23.3	+5.41	0.7332
6	1.749	14.52	1.1621	21 27.1	19.72	1.2948	9 19.5	5.51	0.7412
7	1.758	14.58	1.1639	21 27.5	19.69	1.2942	9 15.7	5.61	0.7490
8	1.768	14.65	1.1657	21 27.8	19.66	1.2935	9 11.9	5.71	0.7565
9	1.777	14.71	1.1675	21 28.1	19.63	1.2929	9 08.1	5.80	0.7638
10	+1.786	14.76	1.1692	21 28.5	19.60	1.2923	9 04.2	+5.90	0.7708
11	1.795	14.82	1.1708	21 28.8	19.57	1.2917	9 00.4	5.99	0.7776
12	1.804	14.88	1.1725	21 29.1	19.54	1.2910	8 56.5	6.08	0.7842
13	1.813	14.93	1.1742	21 29.5	19.52	1.2904	8 52.7	6.17	0.7906
14	1.822	14.99	1.1758	21 29.8	19.49	1.2898	8 48.8	6.26	0.7968
15	+1.831	15.05	1.1775	21 30.1	19.46	1.2892	8 44.9	+6.35	0.8027
16	+1.840	15.10	1.1791	21 30.4	19.43	1.2885	8 41.0	+6.43	0.8085

Date.	Sidereal Time.	τ	f'	g'	g'	G'	j	J
July	^h 18.5	0.4947	^s +0.012	^s 0.008	["] 0.11	^h 3.1	0.05	^{h m} 15 05
	2 18.6	.4974	+ .015	.007	.11	1.7	.05	15 06
	3 18.7	.5002	+ .016	.007	.11	0.3	.05	15 07
	4 18.7	.5029	+ .014	.007	.10	22.5	.05	15 08
	5 18.8	.5056	+ .010	.007	.10	20.9	.05	15 09
	6 18.9	0.5084	+0.004	0.007	0.10	19.1	0.05	15 10
	7 18.9	.5111	- .002	.007	.10	17.5	.06	15 10
	8 19.0	.5138	- .008	.007	.10	15.8	.06	15 11
	9 19.1	.5166	- .014	.007	.11	14.2	.06	15 12
	10 19.1	.5193	- .017	.008	.11	12.7	.06	15 13
	11 19.2	0.5221	-0.018	0.008	0.12	11.1	0.06	15 13
	12 19.3	.5248	- .015	.008	.12	9.7	.06	15 14
	13 19.3	.5275	- .010	.008	.12	8.2	.06	15 15
	14 19.4	.5303	- .003	.007	.11	6.7	.06	15 16
	15 19.5	.5330	+ .004	.007	.10	4.9	.06	15 16
	16 19.5	0.5357	+0.010	0.006	0.09	2.8	0.06	15 17
	17 19.6	.5385	+ .014	.006	.09	0.4	.06	15 17
	18 19.7	.5412	+ .013	.007	.10	22.3	.06	15 18
	19 19.7	.5440	+ .010	.007	.11	20.5	.06	15 19
	20 19.8	.5467	+ .004	.008	.11	18.9	.06	15 19
	21 19.9	0.5494	-0.003	0.007	0.11	17.3	0.06	15 20
	22 19.9	.5522	- .009	.006	.10	15.6	.06	15 20
	23 20.0	.5549	- .012	.006	.08	13.5	.06	15 21
	24 20.1	.5577	- .012	.005	.08	10.9	.06	15 21
	25 20.1	.5604	- .008	.006	.09	8.5	.06	15 22
	26 20.2	0.5631	-0.002	0.007	0.10	6.6	0.06	15 22
	27 20.2	.5659	+ .004	.007	.11	5.0	.06	15 23
	28 20.3	.5686	+ .010	.008	.11	3.6	.06	15 23
	29 20.4	.5713	+ .015	.008	.11	2.2	.06	15 24
	30 20.4	.5741	+ .016	.007	.11	0.7	.06	15 24
Aug.	31 20.5	0.5768	+0.015	0.007	0.10	23.1	0.06	15 25
	1 20.6	.5796	+ .012	.007	.10	21.3	.06	15 25
	2 20.6	.5823	+ .006	.006	.10	19.6	.06	15 26
	3 20.7	.5850	.000	.007	.10	17.9	.06	15 26
	4 20.8	.5878	- .007	.007	.10	16.3	.06	15 26
	5 20.8	0.5905	-0.013	0.007	0.11	14.7	0.06	15 27
	6 20.9	.5932	- .016	.007	.11	13.1	.06	15 27
	7 21.0	.5960	- .018	.008	.12	11.6	.06	15 27
	8 21.0	.5987	- .017	.008	.12	10.2	.06	15 28
	9 21.1	.6015	- .012	.008	.12	8.9	.06	15 28
	10 21.2	0.6042	-0.006	0.007	0.11	7.3	0.06	15 28
	11 21.2	.6069	+ .001	.007	.10	5.7	.06	15 29
	12 21.3	.6097	+ .008	.006	.09	3.7	.06	15 29
	13 21.4	.6124	+ .012	.005	.08	1.2	.07	15 29
	14 21.4	.6151	+ .013	.006	.09	22.7	.07	15 30
	15 21.5	0.6179	+0.011	0.007	0.10	20.9	0.07	15 30
	16 21.6	0.6206	+0.006	0.007	0.11	19.3	0.07	15 30

INDEPENDENT DAY NUMBERS, 1931.

Date.	<i>f</i>	<i>g</i>	log <i>g</i>	<i>G</i>	<i>h</i>	log <i>h</i>	<i>H</i>	<i>i</i>	log <i>i</i>
Aug. 16	+1.840	15.10	1.1791	^h 21 30.4	^m 19.43	1.2885	^h 8 41.0	^m +6.43	0.8085
17	1.848	15.16	1.1808	21 30.7	19.40	1.2879	8 37.1	6.52	0.8140
18	1.857	15.22	1.1824	21 30.9	19.38	1.2873	8 33.1	6.60	0.8194
19	1.865	15.27	1.1839	21 31.2	19.35	1.2867	8 29.1	6.68	0.8246
20	1.873	15.32	1.1854	21 31.5	19.32	1.2861	8 25.2	6.75	0.8296
21	+1.882	15.38	1.1870	21 31.7	19.30	1.2855	8 21.2	+6.83	0.8344
22	1.890	15.43	1.1884	21 32.0	19.27	1.2849	8 17.3	6.90	0.8391
23	1.898	15.48	1.1899	21 32.3	19.24	1.2843	8 13.3	6.98	0.8436
24	1.906	15.54	1.1914	21 32.5	19.22	1.2837	8 09.3	7.05	0.8479
25	1.914	15.59	1.1928	21 32.8	19.20	1.2832	8 05.2	7.11	0.8520
26	+1.922	15.64	1.1942	21 33.1	19.17	1.2826	8 01.2	+7.18	0.8560
27	1.930	15.69	1.1956	21 33.3	19.15	1.2821	7 57.1	7.24	0.8599
28	1.937	15.74	1.1971	21 33.6	19.12	1.2815	7 53.1	7.30	0.8636
29	1.945	15.79	1.1985	21 33.9	19.10	1.2810	7 49.0	7.36	0.8671
30	1.953	15.84	1.1998	21 34.1	19.08	1.2805	7 44.9	7.42	0.8705
31	+1.960	15.89	1.2011	21 34.4	19.05	1.2800	7 40.9	+7.48	0.8737
Sept. 1	1.968	15.94	1.2024	21 34.6	19.03	1.2795	7 36.8	7.53	0.8768
2	1.975	15.98	1.2036	21 34.9	19.02	1.2791	7 32.7	7.58	0.8798
3	1.983	16.03	1.2049	21 35.1	19.00	1.2786	7 28.5	7.63	0.8826
4	1.990	16.07	1.2061	21 35.4	18.98	1.2782	7 24.4	7.68	0.8853
5	+1.997	16.12	1.2074	21 35.7	18.96	1.2778	7 20.3	+7.72	0.8878
6	2.004	16.17	1.2086	21 35.9	18.94	1.2774	7 16.1	7.77	0.8902
7	2.012	16.21	1.2097	21 36.1	18.92	1.2770	7 11.9	7.81	0.8924
8	2.019	16.25	1.2109	21 36.4	18.91	1.2766	7 07.7	7.85	0.8946
9	2.026	16.29	1.2120	21 36.7	18.89	1.2763	7 03.6	7.88	0.8965
10	+2.033	16.34	1.2132	21 36.9	18.88	1.2760	6 59.4	+7.91	0.8984
11	2.040	16.38	1.2144	21 37.2	18.87	1.2757	6 55.2	7.94	0.9001
12	2.047	16.42	1.2155	21 37.5	18.85	1.2754	6 51.0	7.97	0.9017
13	2.054	16.47	1.2166	21 37.8	18.84	1.2751	6 46.8	8.00	0.9032
14	2.060	16.51	1.2177	21 38.1	18.83	1.2749	6 42.6	8.03	0.9045
15	+2.067	16.55	1.2187	21 38.4	18.82	1.2746	6 38.3	+8.05	0.9057
16	2.074	16.58	1.2197	21 38.7	18.81	1.2744	6 34.1	8.07	0.9068
17	2.081	16.62	1.2208	21 38.9	18.81	1.2743	6 29.9	8.09	0.9078
18	2.088	16.66	1.2218	21 39.2	18.80	1.2741	6 25.6	8.10	0.9086
19	2.094	16.70	1.2228	21 39.5	18.79	1.2740	6 21.3	8.12	0.9093
20	+2.101	16.74	1.2238	21 39.8	18.79	1.2739	6 17.1	+8.13	0.9099
21	2.108	16.78	1.2248	21 40.1	18.78	1.2738	6 12.9	8.13	0.9103
22	2.115	16.82	1.2258	21 40.5	18.78	1.2737	6 08.6	8.14	0.9106
23	2.121	16.85	1.2267	21 40.8	18.78	1.2737	6 04.3	8.14	0.9108
24	2.128	16.89	1.2276	21 41.1	18.78	1.2737	6 00.1	8.15	0.9109
25	+2.135	16.92	1.2285	21 41.4	18.78	1.2737	5 55.8	+8.14	0.9108
26	2.142	16.96	1.2295	21 41.7	18.78	1.2737	5 51.5	8.14	0.9106
27	2.148	17.00	1.2305	21 42.1	18.78	1.2738	5 47.3	8.13	0.9103
28	2.155	17.04	1.2314	21 42.5	18.79	1.2739	5 43.0	8.13	0.9099
29	2.162	17.07	1.2323	21 42.8	18.79	1.2740	5 38.7	8.12	0.9093
30	+2.169	17.10	1.2331	21 43.2	18.80	1.2741	5 34.4	+8.10	0.9086
Oct. 1	+2.175	17.14	1.2340	21 43.5	18.81	1.2743	5 30.1	+8.09	0.9078

Date.	Sidereal Time.	τ	f'	g'	g'	G'	j	J
	^h		^s	^s	["]	^h		^h ^m
Aug. 16	21 ^h 6	0.6206	+0.006	0.007	0.11	19.3	0.07	15 30
17	21 ^h 6	.6234	- .001	.007	.11	17.8	.07	15 31
18	21 ^h 7	.6261	- .007	.007	.10	16.3	.07	15 31
19	21 ^h 8	.6288	- .011	.006	.09	14.3	.07	15 31
20	21 ^h 8	.6316	- .011	.005	.07	11.7	.07	15 31
21	21 ^h 9	0.6343	-0.009	0.005	0.08	9.1	0.07	15 32
22	22 ^h 0	.6371	- .004	.006	.10	6.9	.07	15 32
23	22 ^h 0	.6398	+ .003	.007	.11	5.3	.07	15 32
24	22 ^h 1	.6425	+ .009	.008	.12	3.9	.07	15 33
25	22 ^h 2	.6453	+ .014	.008	.12	2.5	.07	15 33
26	22 ^h 2	0.6480	+0.017	0.008	0.11	1.1	0.07	15 33
27	22 ^h 3	.6507	+ .016	.007	.11	23.5	.07	15 33
28	22 ^h 4	.6535	+ .013	.007	.10	21.9	.07	15 34
29	22 ^h 4	.6562	+ .008	.007	.10	20.2	.07	15 34
30	22 ^h 5	.6590	+ .002	.007	.10	18.6	.07	15 34
31	22 ^h 5	0.6617	-0.005	0.007	0.10	16.9	0.07	15 34
Sept. 1	22 ^h 6	.6644	- .011	.007	.10	15.3	.07	15 35
2	22 ^h 7	.6672	- .015	.007	.11	13.6	.07	15 35
3	22 ^h 7	.6699	- .018	.008	.11	12.1	.07	15 35
4	22 ^h 8	.6726	- .017	.008	.12	10.6	.07	15 35
5	22 ^h 9	0.6754	-0.014	0.008	0.12	9.3	0.07	15 36
6	22 ^h 9	.6781	- .009	.008	.12	7.9	.07	15 36
7	23 ^h 0	.6809	- .002	.007	.11	6.4	.07	15 36
8	23 ^h 1	.6836	+ .005	.006	.09	4.7	.07	15 36
9	23 ^h 1	.6863	+ .010	.005	.08	2.3	.07	15 37
10	23 ^h 2	0.6891	+0.012	0.005	0.08	23.5	0.07	15 37
11	23 ^h 3	.6918	+ .011	.006	.09	21.3	.07	15 37
12	23 ^h 3	.6945	+ .006	.007	.11	19.5	.07	15 38
13	23 ^h 4	.6973	.000	.007	.11	18.1	.07	15 38
14	23 ^h 5	.7000	- .006	.007	.10	16.7	.07	15 38
15	23 ^h 5	0.7028	-0.010	0.006	0.09	14.9	0.07	15 38
16	23 ^h 6	.7055	- .012	.005	.08	12.6	.07	15 39
17	23 ^h 7	.7082	- .010	.005	.08	9.9	.07	15 39
18	23 ^h 7	.7110	- .005	.006	.09	7.5	.07	15 39
19	23 ^h 8	.7137	+ .001	.007	.11	5.8	.07	15 40
20	23 ^h 9	0.7165	+0.008	0.008	0.12	4.2	0.07	15 40
21	23 ^h 9	.7192	+ .014	.008	.12	2.9	.07	15 40
22	0 ^h 0	.7219	+ .017	.008	.12	1.5	.07	15 40
23	0 ^h 1	.7247	+ .018	.008	.11	0.0	.07	15 41
24	0 ^h 1	.7274	+ .015	.007	.11	22.4	.07	15 41
25	0 ^h 2	0.7301	+0.011	0.007	0.10	20.8	0.07	15 41
26	0 ^h 3	.7329	+ .005	.007	.10	19.2	.07	15 42
27	0 ^h 3	.7356	- .002	.007	.10	17.5	.07	15 42
28	0 ^h 4	.7384	- .008	.007	.10	15.8	.07	15 42
29	0 ^h 5	.7411	- .013	.007	.10	14.1	.07	15 43
30	0 ^h 5	0.7438	-0.016	0.007	0.11	12.5	0.07	15 43
Oct. 1	0 ^h 6	0.7466	-0.017	0.008	0.11	11.1	0.07	15 44

Date.	<i>f</i>	<i>g</i>	log <i>g</i>	<i>G</i>	<i>h</i>	log <i>h</i>	<i>H</i>	<i>i</i>	log <i>i</i>
Oct. 1	+2.175	17.14	1.2340	21 43.5	18.81	1.2743	5 30.1	+8.09	0.9078
2	2.182	17.17	1.2348	21 43.9	18.81	1.2744	5 25.9	8.07	0.9068
3	2.189	17.21	1.2357	21 44.3	18.82	1.2746	5 21.6	8.05	0.9057
4	2.196	17.24	1.2365	21 44.7	18.83	1.2748	5 17.3	8.03	0.9045
5	2.203	17.27	1.2373	21 45.1	18.84	1.2751	5 13.1	8.00	0.9031
6	+2.210	17.31	1.2382	21 45.5	18.85	1.2754	5 08.8	+7.97	0.9017
7	2.217	17.34	1.2391	21 45.9	18.87	1.2757	5 04.5	7.94	0.9000
8	2.223	17.38	1.2400	21 46.3	18.88	1.2760	5 00.3	7.91	0.8983
9	2.230	17.41	1.2408	21 46.7	18.89	1.2763	4 56.0	7.88	0.8964
10	2.238	17.45	1.2417	21 47.2	18.91	1.2767	4 51.7	7.84	0.8943
11	+2.245	17.48	1.2425	21 47.6	18.93	1.2771	4 47.5	+7.80	0.8921
12	2.252	17.51	1.2433	21 48.1	18.94	1.2774	4 43.3	7.76	0.8898
13	2.259	17.55	1.2442	21 48.6	18.96	1.2778	4 39.0	7.72	0.8874
14	2.266	17.58	1.2451	21 49.1	18.98	1.2783	4 34.8	7.67	0.8847
15	2.274	17.62	1.2459	21 49.5	19.00	1.2787	4 30.5	7.62	0.8820
16	+2.281	17.65	1.2468	21 49.9	19.02	1.2792	4 26.3	+7.57	0.8791
17	2.289	17.68	1.2476	21 50.4	19.04	1.2797	4 22.1	7.52	0.8760
18	2.296	17.72	1.2484	21 50.9	19.06	1.2802	4 17.9	7.46	0.8728
19	2.304	17.75	1.2492	21 51.4	19.09	1.2807	4 13.7	7.40	0.8694
20	2.312	17.78	1.2500	21 51.9	19.11	1.2812	4 09.5	7.34	0.8659
21	+2.319	17.82	1.2509	21 52.4	19.13	1.2817	4 05.3	+7.28	0.8622
22	2.327	17.86	1.2518	21 52.9	19.16	1.2823	4 01.2	7.22	0.8583
23	2.335	17.89	1.2527	21 53.4	19.18	1.2828	3 57.0	7.15	0.8543
24	2.343	17.93	1.2535	21 53.9	19.20	1.2834	3 52.9	7.08	0.8501
25	2.351	17.96	1.2543	21 54.4	19.23	1.2840	3 48.7	7.01	0.8457
26	+2.359	18.00	1.2552	21 54.9	19.26	1.2846	3 44.6	+6.94	0.8411
27	2.368	18.04	1.2562	21 55.5	19.29	1.2852	3 40.5	6.86	0.8364
28	2.376	18.08	1.2572	21 56.1	19.32	1.2859	3 36.3	6.78	0.8315
29	2.384	18.12	1.2582	21 56.6	19.34	1.2865	3 32.2	6.70	0.8263
30	2.393	18.16	1.2591	21 57.1	19.37	1.2871	3 28.1	6.62	0.8210
31	+2.401	18.20	1.2600	21 57.7	19.40	1.2877	3 24.1	+6.54	0.8155
Nov. 1	2.410	18.24	1.2609	21 58.3	19.43	1.2884	3 20.0	6.45	0.8097
2	2.419	18.28	1.2619	21 58.8	19.45	1.2890	3 15.9	6.36	0.8038
3	2.428	18.32	1.2628	21 59.3	19.48	1.2897	3 11.8	6.27	0.7976
4	2.437	18.36	1.2638	21 59.9	19.51	1.2903	3 07.7	6.18	0.7912
5	+2.446	18.40	1.2648	22 00.5	19.54	1.2910	3 03.7	+6.09	0.7846
6	2.455	18.44	1.2658	22 01.1	19.57	1.2916	2 59.7	5.99	0.7777
7	2.464	18.48	1.2668	22 01.6	19.60	1.2923	2 55.7	5.90	0.7706
8	2.473	18.53	1.2678	22 02.2	19.63	1.2929	2 51.7	5.80	0.7632
9	2.483	18.57	1.2689	22 02.8	19.66	1.2936	2 47.7	5.70	0.7556
10	+2.493	18.62	1.2699	22 03.3	19.69	1.2943	2 43.7	+5.59	0.7477
11	2.502	18.66	1.2709	22 03.9	19.72	1.2949	2 39.7	5.49	0.7395
12	2.512	18.71	1.2720	22 04.5	19.75	1.2956	2 35.7	5.38	0.7309
13	2.522	18.76	1.2732	22 05.1	19.78	1.2962	2 31.7	5.27	0.7221
14	2.532	18.81	1.2743	22 05.7	19.81	1.2968	2 27.8	5.16	0.7130
15	+2.542	18.86	1.2754	22 06.3	19.84	1.2975	2 23.9	+5.05	0.7035
16	2.552	18.91	1.2766	22 06.9	19.87	1.2981	2 19.9	+4.94	0.6937

Date.	Sidereal Time.	τ	f'	g'	g'	G'	j	J	
Oct.	1	^h 0 ^h 6	0 ^s 7466	-0 ^s 017	0 ^s 008	0 ^s 11	11 ^m 1	0 ^m 07	15 44
	2	0 ^h 6	7493	-0 ^s 015	0 ^s 008	12	9 ^m 6	07	15 44
	3	0 ^h 7	7520	-0 ^s 010	0 ^s 008	12	8 ^m 3	08	15 44
	4	0 ^h 8	7548	-0 ^s 004	0 ^s 007	11	6 ^m 9	08	15 45
	5	0 ^h 8	7575	+0 ^s 003	0 ^s 006	09	5 ^m 3	08	15 45
	6	0 ^h 9	0 ^s 7603	+0 ^s 003	0 ^s 005	0 ^s 08	3 ^m 3	0 ^m 08	15 45
	7	1 ^h 0	7630	+0 ^s 011	0 ^s 005	07	0 ^m 4	08	15 46
	8	1 ^h 0	7657	+0 ^s 010	0 ^s 005	08	21 ^m 8	08	15 46
	9	1 ^h 1	7685	+0 ^s 007	0 ^s 006	10	19 ^m 8	08	15 47
	10	1 ^h 2	7712	+0 ^s 001	0 ^s 007	11	18 ^m 3	08	15 47
	11	1 ^h 2	0 ^s 7739	-0 ^s 005	0 ^s 007	0 ^s 11	16 ^m 9	0 ^m 08	15 48
	12	1 ^h 3	7767	-0 ^s 010	0 ^s 007	10	15 ^m 3	08	15 48
	13	1 ^h 4	7794	-0 ^s 013	0 ^s 006	09	13 ^m 4	08	15 49
	14	1 ^h 4	7822	-0 ^s 012	0 ^s 005	08	10 ^m 9	08	15 49
	15	1 ^h 5	7849	-0 ^s 007	0 ^s 006	09	8 ^m 3	08	15 49
	16	1 ^h 6	0 ^s 7876	-0 ^s 001	0 ^s 007	0 ^s 10	6 ^m 2	0 ^m 08	15 50
	17	1 ^h 6	7904	+0 ^s 006	0 ^s 008	12	4 ^m 6	08	15 50
	18	1 ^h 7	7931	+0 ^s 013	0 ^s 008	12	3 ^m 2	08	15 51
	19	1 ^h 8	7959	+0 ^s 017	0 ^s 008	12	1 ^m 8	08	15 51
	20	1 ^h 8	7986	+0 ^s 018	0 ^s 008	12	0 ^m 5	08	15 52
	21	1 ^h 9	0 ^s 8013	+0 ^s 017	0 ^s 008	0 ^s 12	23 ^m 0	0 ^m 08	15 52
	22	2 ^h 0	8041	+0 ^s 013	0 ^s 007	11	21 ^m 4	08	15 53
	23	2 ^h 0	8068	+0 ^s 007	0 ^s 007	10	19 ^m 8	08	15 53
	24	2 ^h 1	8095	+0 ^s 001	0 ^s 007	10	18 ^m 1	08	15 54
	25	2 ^h 2	8123	-0 ^s 006	0 ^s 007	10	16 ^m 5	08	15 54
	26	2 ^h 2	0 ^s 8150	-0 ^s 011	0 ^s 007	0 ^s 10	14 ^m 7	0 ^m 08	15 55
	27	2 ^h 3	8178	-0 ^s 015	0 ^s 007	10	13 ^m 0	08	15 55
	28	2 ^h 4	8205	-0 ^s 016	0 ^s 007	11	11 ^m 4	08	15 56
	29	2 ^h 4	8232	-0 ^s 015	0 ^s 008	11	9 ^m 9	08	15 57
	30	2 ^h 5	8260	-0 ^s 011	0 ^s 008	12	8 ^m 6	08	15 57
Nov.	31	2 ^h 6	0 ^s 8287	-0 ^s 006	0 ^s 008	0 ^s 11	7 ^m 3	0 ^m 08	15 58
	1	2 ^h 6	8314	+0 ^s 001	0 ^s 007	10	5 ^m 7	08	15 58
	2	2 ^h 7	8342	+0 ^s 007	0 ^s 006	09	3 ^m 9	08	15 59
	3	2 ^h 8	8369	+0 ^s 010	0 ^s 005	07	1 ^m 3	08	15 59
	4	2 ^h 8	8397	+0 ^s 011	0 ^s 005	07	22 ^m 6	08	16 00
	5	2 ^h 9	0 ^s 8424	+0 ^s 008	0 ^s 006	0 ^s 09	20 ^m 3	0 ^m 08	16 00
	6	2 ^h 9	8451	+0 ^s 003	0 ^s 007	11	18 ^m 6	08	16 01
	7	3 ^h 0	8479	-0 ^s 004	0 ^s 008	11	17 ^m 1	08	16 02
	8	3 ^h 1	8506	-0 ^s 010	0 ^s 007	11	15 ^m 7	08	16 02
	9	3 ^h 1	8533	-0 ^s 013	0 ^s 007	10	13 ^m 8	08	16 03
	10	3 ^h 2	0 ^s 8561	-0 ^s 014	0 ^s 006	0 ^s 09	11 ^m 7	0 ^m 08	16 03
	11	3 ^h 3	8588	-0 ^s 010	0 ^s 006	09	9 ^m 3	08	16 04
	12	3 ^h 3	8616	-0 ^s 004	0 ^s 007	10	7 ^m 1	08	16 05
	13	3 ^h 4	8643	+0 ^s 003	0 ^s 007	11	5 ^m 3	08	16 05
	14	3 ^h 5	8670	+0 ^s 010	0 ^s 008	12	3 ^m 7	08	16 06
	15	3 ^h 5	0 ^s 8698	+0 ^s 016	0 ^s 008	0 ^s 12	2 ^m 3	0 ^m 08	16 06
16	3 ^h 6	8725	+0 ^s 018	0 ^s 008	0 ^s 12	0 ^m 9	0 ^m 08	16 07	

Date.	<i>f</i>	<i>g</i>	log <i>g</i>	<i>G</i>	<i>h</i>	log <i>h</i>	<i>H</i>	<i>i</i>	log <i>i</i>
Nov. 16	+2.552	18.91	1.2766	^h 22 06.9	^m 19.87	1.2981	^h 2 19.9	+4.94	0.6937
17	2.562	18.95	1.2777	22 07.4	19.89	1.2987	2 16.0	4.82	0.6835
18	2.572	19.00	1.2788	22 08.0	19.92	1.2993	2 12.1	4.71	0.6729
19	2.583	19.05	1.2800	22 08.5	19.95	1.2999	2 08.2	4.59	0.6619
20	2.593	19.11	1.2813	22 09.1	19.98	1.3005	2 04.3	4.47	0.6504
21	+2.604	19.16	1.2825	22 09.7	20.00	1.3011	2 00.4	+4.35	0.6385
22	2.615	19.22	1.2837	22 10.3	20.03	1.3017	1 56.5	4.23	0.6262
23	2.626	19.27	1.2849	22 10.9	20.05	1.3022	1 52.7	4.11	0.6133
24	2.636	19.32	1.2861	22 11.4	20.08	1.3028	1 48.8	3.98	0.5999
25	2.647	19.38	1.2874	22 11.9	20.10	1.3033	1 44.9	3.85	0.5859
26	+2.658	19.44	1.2887	22 12.5	20.13	1.3038	1 41.1	+3.72	0.571
27	2.669	19.50	1.2900	22 13.1	20.15	1.3043	1 37.3	3.60	0.556
28	2.681	19.56	1.2913	22 13.6	20.17	1.3048	1 33.5	3.47	0.540
29	2.692	19.62	1.2926	22 14.1	20.20	1.3053	1 29.6	3.34	0.523
30	2.703	19.68	1.2939	22 14.7	20.22	1.3057	1 25.8	3.21	0.506
Dec. 1	+2.715	19.74	1.2953	22 15.2	20.24	1.3062	1 22.0	+3.08	0.488
2	2.726	19.80	1.2966	22 15.7	20.26	1.3066	1 18.2	2.94	0.468
3	2.738	19.86	1.2980	22 16.2	20.28	1.3070	1 14.4	2.80	0.448
4	2.749	19.92	1.2994	22 16.7	20.30	1.3074	1 10.6	2.67	0.426
5	2.761	19.98	1.3007	22 17.2	20.31	1.3078	1 06.8	2.53	0.403
6	+2.773	20.05	1.3021	22 17.7	20.33	1.3081	1 03.0	+2.39	0.379
7	2.784	20.11	1.3035	22 18.2	20.35	1.3085	0 59.3	2.25	0.353
8	2.796	20.18	1.3049	22 18.7	20.36	1.3088	0 55.5	2.12	0.326
9	2.808	20.24	1.3063	22 19.1	20.38	1.3091	0 51.7	1.98	0.296
10	2.820	20.31	1.3078	22 19.6	20.39	1.3094	0 47.9	1.84	0.264
11	+2.832	20.38	1.3093	22 20.1	20.40	1.3096	0 44.2	+1.69	0.229
12	2.844	20.45	1.3107	22 20.5	20.41	1.3099	0 40.5	1.55	0.191
13	2.856	20.52	1.3121	22 21.0	20.42	1.3101	0 36.7	1.41	0.150
14	2.868	20.59	1.3136	22 21.4	20.43	1.3103	0 32.9	1.27	0.104
15	2.880	20.65	1.3150	22 21.8	20.44	1.3105	0 29.2	1.13	0.052
16	+2.893	20.72	1.3164	22 22.2	20.45	1.3106	0 25.5	+0.98	9.993
17	2.905	20.79	1.3179	22 22.6	20.46	1.3108	0 21.7	0.84	9.924
18	2.917	20.87	1.3195	22 23.0	20.46	1.3109	0 18.0	0.70	9.842
19	2.929	20.94	1.3210	22 23.4	20.46	1.3110	0 14.3	0.55	9.741
20	2.942	21.01	1.3225	22 23.8	20.46	1.3110	0 10.5	0.41	9.609
21	+2.954	21.08	1.3239	22 24.1	20.47	1.3111	0 06.7	+0.26	9.418
22	2.966	21.16	1.3255	22 24.5	20.47	1.3111	0 03.0	+0.12	9.068
23	2.978	21.23	1.3270	22 24.9	20.47	1.3111	23 59.3	-0.03	8.446 _n
24	2.990	21.31	1.3285	22 25.2	20.47	1.3111	23 55.5	0.17	9.237 _n
25	3.003	21.38	1.3300	22 25.5	20.47	1.3111	23 51.8	0.32	9.502 _n
26	+3.015	21.45	1.3315	22 25.9	20.46	1.3110	23 48.1	-0.46	9.665 _n
27	3.027	21.52	1.3329	22 26.2	20.46	1.3109	23 44.3	0.61	9.783 _n
28	3.039	21.60	1.3344	22 26.5	20.46	1.3108	23 40.6	0.75	9.876 _n
29	3.052	21.68	1.3360	22 26.8	20.45	1.3107	23 36.9	0.90	9.952 _n
30	3.064	21.75	1.3375	22 27.1	20.45	1.3106	23 33.1	1.04	0.017 _n
31	+3.076	21.83	1.3390	22 27.3	20.44	1.3104	23 29.3	-1.18	0.073 _n
32	+3.088	21.90	1.3405	22 27.6	20.43	1.3102	23 25.6	-1.32	0.122 _n

Date.	Sidereal Time.	τ	f'	g'	g'	G'	j	J
	^h		^s	^s	^s	^h		^h ^m
Nov. 16	3.6	0.8725	+0.018	0.008	0.12	0.9	0.03	16 07
17	3.7	.8752	+ .018	.008	.12	23.4	.08	16 07
18	3.7	.8780	+ .015	.008	.11	21.9	.08	16 08
19	3.8	.8807	+ .009	.007	.11	20.3	.08	16 09
20	3.9	.8835	+ .003	.007	.10	18.7	.08	16 09
21	3.9	0.8862	-0.004	0.007	0.10	17.1	0.08	16 10
22	4.0	.8889	- .010	.006	.10	15.3	.08	16 10
23	4.1	.8917	- .014	.007	.10	13.5	.08	16 11
24	4.1	.8944	- .016	.007	.10	11.9	.08	16 11
25	4.2	.8972	- .015	.007	.11	10.3	.08	16 12
26	4.3	0.8999	-0.012	0.007	0.11	8.9	0.08	16 13
27	4.3	.9026	- .006	.007	.11	7.5	.09	16 13
28	4.4	.9054	.000	.007	.10	6.0	.09	16 14
29	4.5	.9081	+ .006	.006	.09	4.3	.09	16 14
30	4.5	.9108	+ .010	.005	.08	2.1	.09	16 15
Dec. 1	4.6	0.9136	+0.012	0.005	0.08	23.5	0.09	16 15
2	4.7	.9163	+ .010	.006	.09	21.1	.09	16 16
3	4.7	.9191	+ .005	.007	.10	19.2	.09	16 16
4	4.8	.9218	+ .002	.008	.11	17.6	.09	16 17
5	4.9	.9245	- .008	.008	.11	16.1	.09	16 17
6	4.9	0.9273	-0.013	0.007	0.11	14.5	0.09	16 18
7	5.0	.9300	- .015	.006	.10	12.5	.09	16 18
8	5.1	.9327	- .013	.006	.09	10.2	.09	16 19
9	5.1	.9355	- .008	.006	.10	8.0	.09	16 19
10	5.2	.9382	.000	.007	.11	6.1	.09	16 20
11	5.2	0.9410	+0.007	0.008	0.11	4.4	0.09	16 20
12	5.3	.9437	+ .013	.008	.12	2.8	.09	16 21
13	5.4	.9464	+ .017	.008	.12	1.3	.09	16 21
14	5.4	.9492	+ .018	.008	.12	23.9	.09	16 21
15	5.5	.9519	+ .016	.007	.11	22.3	.09	16 22
16	5.6	0.9546	+0.011	0.007	0.11	20.8	0.09	16 22
17	5.6	.9574	+ .005	.007	.10	19.2	.09	16 23
18	5.7	.9601	- .002	.006	.10	17.6	.09	16 23
19	5.8	.9629	- .008	.006	.10	15.9	.09	16 23
20	5.8	.9656	- .013	.006	.10	14.1	.09	16 24
21	5.9	0.9683	-0.015	0.007	0.10	12.4	0.09	16 24
22	6.0	.9711	- .015	.007	.11	10.7	.09	16 25
23	6.0	.9738	- .013	.007	.11	9.3	.09	16 25
24	6.1	.9766	- .008	.007	.11	7.9	.09	16 25
25	6.2	.9793	- .002	.007	.11	6.4	.09	16 26
26	6.2	0.9820	+0.005	0.006	0.09	4.8	0.09	16 26
27	6.3	.9848	+ .010	.005	.08	2.7	.09	16 26
28	6.4	.9875	+ .012	.005	.08	0.3	.09	16 26
29	6.4	.9902	+ .012	.006	.09	22.0	.09	16 27
30	6.5	.9930	+ .008	.007	.10	20.0	.09	16 27
31	6.6	0.9957	+0.002	0.007	0.11	18.4	0.10	16 27
32	6.6	0.9985	-0.005	0.007	0.11	16.8	0.10	16 28

THE FUNCTION $F(a)$ IN UNITS OF THE SECOND DECIMAL.

Date.	^h 0·0	^h 0·5	^h 1·0	^h 1·5	^h 2·0	^h 2·5	^h 3·0	^h 3·5	^h 4·0	^h 4·5	^h 5·0	^h 5·5	^h 6·0
Jan. 1	± 9	± 9	± 9	± 9	± 8	± 8	± 7	± 6	± 6	± 5	± 4	± 2	± 1
6	± 9	± 9	± 9	± 9	± 8	± 8	± 8	± 7	± 6	± 5	± 4	± 3	± 2
11	± 8	± 9	± 9	± 9	± 9	± 8	± 8	± 7	± 7	± 6	± 5	± 4	± 3
16	± 8	± 8	± 9	± 9	± 9	± 8	± 8	± 8	± 7	± 6	± 5	± 4	± 3
21	± 8	± 8	± 9	± 9	± 9	± 9	± 8	± 8	± 7	± 7	± 6	± 5	± 4
26	± 7	± 8	± 8	± 8	± 9	± 9	± 8	± 8	± 8	± 7	± 6	± 6	± 5
31	± 7	± 7	± 8	± 8	± 8	± 9	± 8	± 8	± 8	± 7	± 7	± 6	± 5
Feb. 5	± 6	± 7	± 8	± 8	± 8	± 8	± 8	± 8	± 8	± 8	± 7	± 6	± 6
10	± 6	± 6	± 7	± 8	± 8	± 8	± 8	± 8	± 8	± 8	± 8	± 7	± 6
15	± 5	± 6	± 7	± 8	± 8	± 8	± 8	± 8	± 8	± 8	± 8	± 7	± 7
20	± 4	± 5	± 6	± 7	± 7	± 8	± 8	± 8	± 8	± 8	± 8	± 8	± 7
25	± 4	± 5	± 5	± 6	± 7	± 7	± 8	± 8	± 8	± 8	± 8	± 8	± 7
Mar. 2	± 3	± 4	± 5	± 6	± 6	± 7	± 8	± 8	± 8	± 8	± 8	± 8	± 8
7	± 2	± 3	± 4	± 5	± 6	± 7	± 7	± 8	± 8	± 8	± 8	± 8	± 8
12	± 1	± 3	± 3	± 4	± 5	± 6	± 7	± 7	± 8	± 8	± 8	± 8	± 8
17	± 1	± 2	± 3	± 4	± 5	± 6	± 6	± 7	± 7	± 8	± 8	± 8	± 8
22	0	± 1	± 2	± 3	± 4	± 5	± 6	± 6	± 7	± 8	± 8	± 8	± 8
27	± 1	0	± 1	± 2	± 3	± 4	± 5	± 6	± 7	± 7	± 8	± 8	± 8
Apr. 1	± 2	0	0	± 2	± 3	± 4	± 5	± 5	± 6	± 7	± 7	± 8	± 8
6	± 2	± 1	0	± 1	± 2	± 3	± 4	± 5	± 6	± 6	± 7	± 7	± 8
11	± 3	± 2	± 1	0	± 1	± 2	± 3	± 4	± 5	± 6	± 7	± 7	± 8
16	± 4	± 3	± 2	± 1	0	± 1	± 2	± 4	± 4	± 5	± 6	± 7	± 7
21	± 4	± 3	± 2	± 1	0	± 1	± 2	± 3	± 4	± 5	± 6	± 6	± 7
26	± 5	± 4	± 3	± 2	± 1	0	± 1	± 2	± 3	± 4	± 5	± 6	± 7
May 1	± 6	± 5	± 4	± 3	± 2	± 1	0	± 1	± 2	± 4	± 5	± 5	± 6
6	± 6	± 5	± 5	± 4	± 3	± 1	0	± 1	± 2	± 3	± 4	± 5	± 6
11	± 7	± 6	± 5	± 4	± 3	± 2	± 1	0	± 1	± 2	± 3	± 4	± 5
16	± 7	± 7	± 6	± 5	± 4	± 3	± 2	± 1	± 1	± 2	± 3	± 4	± 5
21	± 8	± 7	± 6	± 5	± 5	± 3	± 2	± 1	0	± 1	± 2	± 3	± 4
26	± 8	± 7	± 7	± 6	± 5	± 4	± 3	± 2	± 1	0	± 1	± 3	± 4
31	± 8	± 8	± 7	± 7	± 6	± 5	± 4	± 3	± 2	0	± 1	± 2	± 3
June 5	± 8	± 8	± 8	± 7	± 6	± 5	± 4	± 3	± 2	± 1	0	± 1	± 2
10	± 9	± 8	± 8	± 7	± 7	± 6	± 5	± 4	± 3	± 2	± 1	0	± 2
15	± 9	± 9	± 8	± 8	± 7	± 6	± 5	± 4	± 3	± 2	± 1	0	± 1
20	± 9	± 9	± 8	± 8	± 8	± 7	± 6	± 5	± 4	± 3	± 2	± 1	0
25	± 9	± 9	± 9	± 8	± 8	± 7	± 6	± 6	± 5	± 4	± 3	± 1	0
30	± 9	± 9	± 9	± 9	± 8	± 8	± 7	± 6	± 5	± 4	± 3	± 2	± 1
	^h 12·0	^h 12·5	^h 13·0	^h 13·5	^h 14·0	^h 14·5	^h 15·0	^h 15·5	^h 16·0	^h 16·5	^h 17·0	^h 17·5	^h 18·0

The upper sign is to be used when the value of a or $(a+6^h)$ is found at the head of the table and the lower sign when this value is at the foot of the table.

$$\text{Differential aberration in R.A.} = F(a) \frac{\sec \delta}{15} \Delta a - F(a+6^h) \frac{\sec \delta \tan \delta}{225} \Delta \delta$$

$$\text{Differential aberration in Dec.} = F(a+6^h) \sin \delta \Delta a + F(a) \frac{\cos \delta}{15} \Delta \delta$$

where Δa and $\Delta \delta$ are in units of r^m and r' respectively, in the sense moving object *minus* star. The functions of δ required are tabulated on page 290.

THE FUNCTION $F(a)$ IN UNITS OF THE SECOND DECIMAL.

Date.	^h 6·0	^h 6·5	^h 7·0	^h 7·5	^h 8·0	^h 8·5	^h 9·0	^h 9·5	^h 10·0	^h 10·5	^h 11·0	^h 11·5	^h 12·0
Jan. 1	± 1	0	± 1	± 2	± 3	± 4	± 5	± 6	± 7	± 8	± 8	± 8	± 9
6	± 2	± 1	0	± 1	± 2	± 4	± 5	± 6	± 6	± 7	± 8	± 8	± 9
11	± 3	± 2	0	± 1	± 2	± 3	± 4	± 5	± 6	± 7	± 7	± 8	± 8
16	± 3	± 2	± 1	0	± 1	± 2	± 3	± 4	± 5	± 6	± 7	± 7	± 8
21	± 4	± 3	± 2	± 1	0	± 1	± 3	± 4	± 5	± 5	± 6	± 7	± 8
26	± 5	± 4	± 3	± 2	0	± 1	± 2	± 3	± 4	± 5	± 6	± 7	± 7
31	± 5	± 4	± 3	± 2	± 1	0	± 1	± 2	± 3	± 4	± 5	± 6	± 7
Feb. 5	± 6	± 5	± 4	± 3	± 2	± 1	0	± 1	± 2	± 4	± 5	± 5	± 6
10	± 6	± 5	± 5	± 4	± 2	± 1	0	± 1	± 2	± 3	± 4	± 5	± 6
15	± 7	± 6	± 5	± 4	± 3	± 2	± 1	0	± 1	± 2	± 3	± 4	± 5
20	± 7	± 6	± 6	± 5	± 4	± 3	± 2	± 1	0	± 1	± 2	± 3	± 4
25	± 7	± 7	± 6	± 5	± 5	± 4	± 3	± 2	0	0	± 2	± 3	± 4
Mar. 2	± 8	± 7	± 7	± 6	± 5	± 4	± 3	± 2	± 1	0	± 1	± 2	± 3
7	± 8	± 8	± 7	± 6	± 6	± 5	± 4	± 3	± 2	± 1	0	± 1	± 2
12	± 8	± 8	± 7	± 7	± 6	± 5	± 5	± 4	± 3	± 2	± 1	0	± 1
17	± 8	± 8	± 8	± 7	± 7	± 6	± 5	± 4	± 3	± 2	± 1	0	± 1
22	± 8	± 8	± 8	± 8	± 7	± 7	± 6	± 5	± 4	± 3	± 2	± 1	0
27	± 8	± 8	± 8	± 8	± 7	± 7	± 6	± 6	± 5	± 4	± 3	± 2	± 1
Apr. 1	± 8	± 8	± 8	± 8	± 8	± 7	± 7	± 6	± 5	± 5	± 4	± 3	± 2
6	± 8	± 8	± 8	± 8	± 8	± 8	± 7	± 7	± 6	± 5	± 4	± 3	± 2
11	± 8	± 8	± 8	± 8	± 8	± 8	± 8	± 7	± 6	± 6	± 5	± 4	± 3
16	± 7	± 8	± 8	± 8	± 8	± 8	± 8	± 7	± 7	± 6	± 6	± 5	± 4
21	± 7	± 8	± 8	± 8	± 8	± 8	± 8	± 8	± 7	± 7	± 6	± 5	± 4
26	± 7	± 7	± 8	± 8	± 8	± 8	± 8	± 8	± 8	± 7	± 7	± 6	± 5
May 1	± 6	± 7	± 8	± 8	± 8	± 8	± 8	± 8	± 8	± 8	± 7	± 6	± 6
6	± 6	± 7	± 7	± 8	± 8	± 8	± 8	± 9	± 8	± 8	± 8	± 7	± 6
11	± 5	± 6	± 7	± 7	± 8	± 8	± 9	± 9	± 9	± 8	± 8	± 7	± 7
16	± 5	± 6	± 6	± 7	± 8	± 8	± 8	± 9	± 9	± 8	± 8	± 8	± 7
21	± 4	± 5	± 6	± 7	± 7	± 8	± 8	± 9	± 9	± 9	± 8	± 8	± 8
26	± 4	± 5	± 6	± 6	± 7	± 8	± 8	± 9	± 9	± 9	± 9	± 8	± 8
31	± 3	± 4	± 5	± 6	± 7	± 7	± 8	± 8	± 9	± 9	± 9	± 9	± 8
June 5	± 2	± 3	± 4	± 5	± 6	± 7	± 8	± 8	± 9	± 9	± 9	± 9	± 8
10	± 2	± 3	± 4	± 5	± 6	± 7	± 7	± 8	± 8	± 9	± 9	± 9	± 9
15	± 1	± 2	± 3	± 4	± 5	± 6	± 7	± 8	± 8	± 9	± 9	± 9	± 9
20	0	± 1	± 3	± 4	± 5	± 6	± 6	± 7	± 8	± 8	± 9	± 9	± 9
25	0	± 1	± 2	± 3	± 4	± 5	± 6	± 7	± 7	± 8	± 8	± 9	± 9
30	± 1	0	± 1	± 2	± 3	± 5	± 6	± 6	± 7	± 8	± 8	± 9	± 9
	^h 18·0	^h 18·5	^h 19·0	^h 19·5	^h 20·0	^h 20·5	^h 21·0	^h 21·5	^h 22·0	^h 22·5	^h 23·0	^h 23·5	^h 24·0

The upper sign is to be used when the value of a or $(a + 6^h)$ is found at the head of the table and the lower sign when this value is at the foot of the table.

This table should be used without interpolation, using the date nearest to the date of observation, and the value of a nearest to the Right Ascension of the star.

The maximum value of the differential aberration for two objects separated by 1° is of the order $0^s.02 \sec \delta$ in Right Ascension, or $0^s.3$ in Declination.

DIFFERENTIAL ABERRATION.

THE FUNCTION $F(a)$ IN UNITS OF THE SECOND DECIMAL.

Date.	0°	$0^{\circ}5'$	1°	$1^{\circ}5'$	2°	$2^{\circ}5'$	3°	$3^{\circ}5'$	4°	$4^{\circ}5'$	5°	$5^{\circ}5'$	6°
July 5-	± 9	± 9	± 9	± 9	± 8	± 8	± 7	± 7	± 6	± 5	± 4	± 3	± 2
10-	± 8	± 9	± 9	± 9	± 9	± 8	± 8	± 7	± 6	± 5	± 4	± 3	± 2
15	± 8	± 9	± 9	± 9	± 9	± 8	± 8	± 7	± 6	± 5	± 4	± 3	± 2
20	± 8	± 8	± 9	± 9	± 9	± 8	± 8	± 7	± 6	± 5	± 4	± 3	± 2
25	± 8	± 8	± 8	± 9	± 9	± 9	± 8	± 8	± 7	± 6	± 5	± 4	± 3
30	± 7	± 8	± 8	± 8	± 9	± 9	± 9	± 8	± 8	± 7	± 6	± 5	± 4
Aug. 4	± 7	± 7	± 8	± 8	± 9	± 9	± 9	± 8	± 8	± 7	± 6	± 5	± 4
9	± 6	± 7	± 8	± 8	± 8	± 9	± 8	± 8	± 8	± 8	± 7	± 6	± 5
14	± 6	± 6	± 7	± 8	± 8	± 8	± 8	± 8	± 8	± 8	± 8	± 7	± 6
19	± 5	± 6	± 7	± 7	± 8	± 8	± 8	± 8	± 8	± 8	± 8	± 7	± 6
24	± 4	± 5	± 6	± 7	± 7	± 8	± 8	± 8	± 8	± 8	± 8	± 8	± 7
29	± 4	± 5	± 6	± 6	± 7	± 7	± 8	± 8	± 8	± 8	± 8	± 8	± 7
Sept. 3	± 3	± 4	± 5	± 6	± 6	± 7	± 8	± 8	± 8	± 8	± 8	± 8	± 7
8	± 2	± 3	± 4	± 5	± 6	± 7	± 8	± 8	± 8	± 8	± 8	± 8	± 7
13	± 2	± 3	± 4	± 5	± 5	± 6	± 7	± 7	± 8	± 8	± 8	± 8	± 7
18	± 1	± 2	± 3	± 4	± 5	± 6	± 6	± 7	± 8	± 8	± 8	± 8	± 7
23	± 0	± 1	± 2	± 3	± 4	± 5	± 6	± 7	± 7	± 8	± 8	± 8	± 7
28	∓ 1	± 0	± 1	± 2	± 4	± 4	± 5	± 6	± 7	± 7	± 8	± 8	± 7
Oct. 3	∓ 1	± 0	± 1	± 2	± 3	± 4	± 5	± 6	± 6	± 7	± 7	± 8	± 7
8	∓ 2	∓ 1	± 0	± 1	± 2	± 3	± 4	± 5	± 6	± 6	± 7	± 8	± 7
13	∓ 3	∓ 2	∓ 1	± 0	± 1	± 2	± 3	± 4	± 5	± 6	± 7	± 7	± 8
18	∓ 4	∓ 2	∓ 2	± 0	± 1	± 2	± 3	± 4	± 5	± 5	± 6	± 7	± 7
23	∓ 4	∓ 3	∓ 2	∓ 1	± 0	± 1	± 2	± 3	± 4	± 5	± 6	± 7	± 7
28	∓ 5	∓ 4	∓ 3	∓ 2	∓ 1	± 0	± 1	± 2	± 3	± 4	± 5	± 6	± 7
Nov. 2	∓ 6	∓ 5	∓ 4	∓ 3	∓ 2	± 0	± 1	± 2	± 3	± 4	± 5	± 6	± 7
7	∓ 6	∓ 5	∓ 4	∓ 3	∓ 2	∓ 1	± 0	± 1	± 2	± 3	± 4	± 5	± 6
12	∓ 7	∓ 6	∓ 5	∓ 4	∓ 3	∓ 2	∓ 1	± 0	± 1	± 2	± 3	± 4	± 5
17	∓ 7	∓ 6	∓ 6	∓ 5	∓ 4	∓ 3	∓ 2	∓ 1	± 1	± 2	± 3	± 4	± 5
22	∓ 8	∓ 7	∓ 6	∓ 5	∓ 4	∓ 3	∓ 2	∓ 1	± 0	± 1	± 2	± 3	± 4
27	∓ 8	∓ 7	∓ 7	∓ 6	∓ 5	∓ 4	∓ 3	∓ 2	∓ 1	± 0	± 1	± 2	± 3
Dec. 2	∓ 8	∓ 8	∓ 7	∓ 7	∓ 6	∓ 5	∓ 4	∓ 3	∓ 2	± 0	± 1	± 2	± 3
7	∓ 9	∓ 8	∓ 8	∓ 7	∓ 6	∓ 5	∓ 4	∓ 3	∓ 2	∓ 1	± 0	± 1	± 2
12	∓ 9	∓ 8	∓ 8	∓ 7	∓ 7	∓ 6	∓ 5	∓ 4	∓ 3	∓ 2	∓ 1	± 0	± 2
17	∓ 9	∓ 9	∓ 8	∓ 8	∓ 7	∓ 7	∓ 6	∓ 5	∓ 4	∓ 3	∓ 2	∓ 1	± 0
22	∓ 9	∓ 9	∓ 9	∓ 8	∓ 8	∓ 7	∓ 6	∓ 5	∓ 4	∓ 3	∓ 2	∓ 1	± 0
27	∓ 9	∓ 9	∓ 9	∓ 8	∓ 8	∓ 7	∓ 7	∓ 6	∓ 5	∓ 4	∓ 3	∓ 2	∓ 1
32	∓ 9	∓ 9	∓ 9	∓ 9	∓ 8	∓ 8	∓ 7	∓ 7	∓ 6	∓ 5	∓ 4	∓ 3	∓ 2
	$12^{\circ}0'$	$12^{\circ}5'$	$13^{\circ}0'$	$13^{\circ}5'$	$14^{\circ}0'$	$14^{\circ}5'$	$15^{\circ}0'$	$15^{\circ}5'$	$16^{\circ}0'$	$16^{\circ}5'$	$17^{\circ}0'$	$17^{\circ}5'$	$18^{\circ}0'$

The upper sign is to be used when the value of a or $(a+6^h)$ is found at the head of the table and the lower sign when this value is at the foot of the table.

$$\text{Differential aberration in R.A.} = F(a) \frac{\sec \delta}{15} \Delta a - F(a+6^h) \frac{\sec \delta \tan \delta}{225} \Delta \delta$$

$$\text{Differential aberration in Dec.} = F(a+6^h) \sin \delta \Delta a + F(a) \frac{\cos \delta}{15} \Delta \delta$$

where Δa and $\Delta \delta$ are in units of r^m and r' respectively, in the sense moving object *minus* star. The functions of δ required are tabulated on page 290.

THE FUNCTION $F(\alpha)$ IN UNITS OF THE SECOND DECIMAL.

Date.	^h 6.0	^h 6.5	^h 7.0	^h 7.5	^h 8.0	^h 8.5	^h 9.0	^h 9.5	^h 10.0	^h 10.5	^h 11.0	^h 11.5	^h 12.0
July 5	± 2	± 1	干 1	干 2	干 3	干 4	干 5	干 6	干 7	干 7	干 8	干 8	干 9
10	± 2	± 1	0	干 1	干 2	干 3	干 4	干 5	干 6	干 7	干 8	干 8	干 8
15	± 3	± 2	± 1	0	干 1	干 3	干 4	干 5	干 6	干 7	干 7	干 8	干 8
20	± 4	± 3	± 1	0	干 1	干 2	干 3	干 4	干 5	干 6	干 7	干 7	干 8
25	± 4	± 3	± 2	± 1	0	干 1	干 2	干 3	干 4	干 5	干 6	干 7	干 8
Aug. 30	± 5	± 4	± 3	± 2	± 1	干 1	干 2	干 3	干 4	干 5	干 6	干 7	干 7
4	± 5	± 4	± 3	± 2	± 1	0	干 1	干 2	干 3	干 4	干 5	干 6	干 7
9	± 6	± 5	± 4	± 3	± 2	± 1	0	干 1	干 2	干 4	干 5	干 5	干 6
14	± 6	± 5	± 5	± 4	± 2	± 1	0	干 1	干 2	干 3	干 4	干 5	干 6
19	± 7	± 6	± 5	± 4	± 3	± 2	± 1	0	干 1	干 2	干 3	干 4	干 5
24	± 7	± 6	± 6	± 5	± 4	± 3	± 2	± 1	0	干 1	干 2	干 3	干 4
29	± 7	± 7	± 6	± 5	± 4	± 4	± 2	± 1	0	干 1	干 2	干 3	干 4
Sept. 3	± 8	± 7	± 7	± 6	± 5	± 4	± 3	± 2	± 1	0	干 1	干 2	干 3
8	± 8	± 7	± 7	± 6	± 6	± 5	± 4	± 3	± 2	± 1	0	干 1	干 2
13	± 8	± 8	± 7	± 7	± 6	± 5	± 4	± 4	± 3	± 2	0	干 1	干 2
18	± 8	± 8	± 8	± 7	± 7	± 6	± 5	± 4	± 3	± 2	± 1	0	干 1
23	± 8	± 8	± 8	± 7	± 7	± 6	± 6	± 5	± 4	± 3	± 2	± 1	0
28	± 8	± 8	± 8	± 8	± 7	± 6	± 6	± 5	± 4	± 3	± 2	± 2	± 1
Oct. 3	± 8	± 8	± 8	± 8	± 8	± 7	± 7	± 6	± 5	± 4	± 3	± 2	± 1
8	± 8	± 8	± 8	± 8	± 8	± 8	± 7	± 6	± 6	± 5	± 4	± 3	± 2
13	± 8	± 8	± 8	± 8	± 8	± 8	± 7	± 7	± 6	± 6	± 5	± 4	± 3
18	± 7	± 8	± 8	± 8	± 8	± 8	± 8	± 7	± 7	± 7	± 6	± 5	± 4
23	± 7	± 8	± 8	± 8	± 8	± 8	± 8	± 8	± 7	± 7	± 6	± 5	± 4
28	± 7	± 7	± 8	± 8	± 8	± 8	± 8	± 8	± 8	± 7	± 7	± 6	± 5
Nov. 2	± 6	± 7	± 8	± 8	± 8	± 8	± 8	± 8	± 8	± 8	± 7	± 6	± 6
7	± 6	± 7	± 7	± 8	± 8	± 8	± 8	± 8	± 8	± 8	± 7	± 7	± 6
12	± 5	± 6	± 7	± 8	± 8	± 8	± 9	± 9	± 8	± 8	± 8	± 7	± 7
17	± 5	± 6	± 7	± 7	± 8	± 8	± 8	± 9	± 9	± 8	± 8	± 8	± 7
22	± 4	± 5	± 6	± 7	± 7	± 8	± 8	± 9	± 9	± 9	± 8	± 8	± 8
27	± 4	± 5	± 6	± 6	± 7	± 8	± 8	± 9	± 9	± 9	± 9	± 8	± 8
Dec. 2	± 3	± 4	± 5	± 6	± 7	± 7	± 8	± 8	± 9	± 9	± 9	± 9	± 8
7	± 2	± 3	± 4	± 5	± 6	± 7	± 8	± 8	± 8	± 9	± 9	± 9	± 9
12	± 2	± 3	± 4	± 5	± 6	± 7	± 7	± 8	± 8	± 9	± 9	± 9	± 9
17	± 1	± 2	± 3	± 4	± 5	± 6	± 7	± 8	± 8	± 8	± 9	± 9	± 9
22	0	± 1	± 2	± 3	± 4	± 6	± 6	± 7	± 8	± 8	± 9	± 9	± 9
27	干 1	± 1	± 2	± 3	± 4	± 5	± 6	± 7	± 7	± 8	± 8	± 9	± 9
32	干 1	0	± 1	± 2	± 3	± 4	± 5	± 6	± 7	± 8	± 8	± 8	± 9
	^h 18.0	^h 18.5	^h 19.0	^h 19.5	^h 20.0	^h 20.5	^h 21.0	^h 21.5	^h 22.0	^h 22.5	^h 23.0	^h 23.5	^h 24.0

The upper sign is to be used when the value of α or ($\alpha + 6^h$) is found at the head of the table and the lower sign when this value is at the foot of the table.

This table should be used without interpolation, using the date nearest to the date of observation, and the value of α nearest to the Right Ascension of the star.

The maximum value of the differential aberration for two objects separated by 1° is of the order 0.02 sec δ in Right Ascension, or 0.3 in Declination.

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Date.	<i>j</i>	<i>J</i>	δ	$\frac{\tan \delta}{15}$	$\frac{\sec^2 \delta}{225}$	$\frac{\sec \delta}{15}$	$\frac{\tan \delta \sec \delta}{225}$	$\sin \delta$	$\frac{\cos \delta}{15}$
Jan. 1	1.67	6 04	0	0.000	0.004	0.07	0.000	0.00	0.07
11	1.67	6 04	5	.006	.004	.07	.000	.09	.07
21	1.66	6 05	10	.012	.005	.07	.001	.17	.07
31	1.66	6 05	15	.018	.005	.07	.001	.26	.06
Feb. 10	1.66	6 05	20	.024	.005	.07	.002	.34	.06
20	1.66	6 05	25	0.031	0.005	0.07	0.002	0.42	0.06
Mar. 2	1.65	6 05	30	.038	.006	.08	.003	.50	.06
12	1.65	6 05	35	.047	.007	.08	.004	.57	.05
22	1.65	6 05	40	0.056	0.008	0.09	0.005	0.64	0.05
Apr. 1	1.65	6 05	41	.058	.008	.09	.005	.66	.05
11	1.65	6 05	42	.060	.008	.09	.005	.67	.05
21	1.64	6 05	43	.062	.008	.09	.006	.68	.05
May 1	1.64	6 05	44	.064	.009	.09	.006	.69	.05
11	1.64	6 05	45	0.067	0.009	0.09	0.006	0.71	0.05
21	1.64	6 05	46	.069	.009	.10	.007	.72	.05
31	1.63	6 05	47	.071	.010	.10	.007	.73	.05
June 10	1.63	6 05	48	.074	.010	.10	.007	.74	.04
20	1.63	6 05	49	.077	.010	.10	.008	.75	.04
30	1.62	6 05	50	0.079	0.011	0.10	0.008	0.77	0.04
July 10	1.62	6 05	51	.082	.011	.11	.009	.78	.04
20	1.62	6 05	52	.085	.012	.11	.009	.79	.04
30	1.61	6 05	53	.088	.012	.11	.010	.80	.04
Aug. 9	1.61	6 05	54	.092	.013	.11	.010	.81	.04
19	1.61	6 05	55	0.095	0.014	0.12	0.011	0.82	0.04
29	1.61	6 05	56	.099	.014	.12	.012	.83	.04
Sept. 8	1.60	6 05	57	.103	.015	.12	.013	.84	.04
18	1.60	6 05	58	.107	.016	.13	.013	.85	.04
28	1.60	6 06	59	.111	.017	.13	.014	.86	.03
Oct. 8	1.60	6 06	60	0.115	0.018	0.13	0.015	0.87	0.03
18	1.60	6 05	61	.120	.019	.14	.017	.87	.03
28	1.59	6 05	62	.125	.020	.14	.018	.88	.03
Nov. 7	1.59	6 05	63	.131	.022	.15	.019	.89	.03
17	1.59	6 05	64	.137	.023	.15	.021	.90	.03
27	1.59	6 05	65	0.143	0.025	0.16	0.023	0.91	0.03
Dec. 7	1.58	6 05	66	.150	.027	.16	.025	.91	.03
17	1.58	6 05	67	.157	.029	.17	.027	.92	.03
27	1.58	6 05	68	.165	.032	.18	.029	.93	.02
37	1.57	6 05	69	.174	.035	.19	.032	.93	.02
The above values of <i>j</i> and <i>J</i> are for reduction to the mean equinox of 1950.0. The values on pages 271-285 are for reduction to the mean equinox of 1931.0.			70	0.183	0.038	0.19	0.036	0.94	0.02
			71	.194	.042	.20	.040	.95	.02
			72	.205	.047	.22	.044	.95	.02
			73	.218	.052	.23	.050	.96	.02
			74	.232	.058	.24	.056	.96	.02
			75	0.249	0.066	0.26	0.064	0.97	0.02

If $\Delta\alpha$ and $\Delta\delta$, in units of r'' and r' respectively, are the observed differences of co-ordinates, in the sense moving object *minus* star, the necessary corrections for differential precession and nutation are—

$$\begin{aligned} \text{In R.A.} \quad & j \sin(J+\alpha) \frac{\tan \delta}{15} \Delta\alpha - j \cos(J+\alpha) \frac{\sec^2 \delta}{225} \Delta\delta \quad \text{in seconds of time.} \\ \text{In Dec.} \quad & j \cos(J+\alpha) \Delta\alpha \quad \text{in seconds of arc.} \end{aligned}$$

m	0 ^h		1 ^h		2 ^h		
	Sin	Cos	Sin	Cos	Sin	Cos	
0	0.000	1.000	0.259	0.966	0.500	0.866	60
1	.004	1.000	.263	.965	.504	.864	59
2	.009	1.000	.267	.964	.508	.862	58
3	.013	1.000	.271	.962	.511	.859	57
4	.017	1.000	.276	.961	.515	.857	56
5	0.022	1.000	0.280	0.960	0.519	0.855	55
6	.026	1.000	.284	.959	.522	.853	54
7	.031	1.000	.288	.958	.526	.850	53
8	.035	0.999	.292	.956	.530	.848	52
9	.039	0.999	.297	.955	.534	.846	51
10	0.044	0.999	0.301	0.954	0.537	0.843	50
11	.048	.999	.305	.952	.541	.841	49
12	.052	.999	.309	.951	.545	.839	48
13	.057	.998	.313	.950	.548	.836	47
14	.061	.998	.317	.948	.552	.834	46
15	0.065	0.998	0.321	0.947	0.556	0.831	45
16	.070	.998	.326	.946	.559	.829	44
17	.074	.997	.330	.944	.563	.827	43
18	.078	.997	.334	.943	.566	.824	42
19	.083	.997	.338	.941	.570	.822	41
20	0.087	0.996	0.342	0.940	0.574	0.819	40
21	.092	.996	.346	.938	.577	.817	39
22	.096	.995	.350	.937	.581	.814	38
23	.100	.995	.354	.935	.584	.812	37
24	.105	.995	.358	.934	.588	.809	36
25	0.109	0.994	0.362	0.932	0.591	0.806	35
26	.113	.994	.367	.930	.595	.804	34
27	.118	.993	.371	.929	.598	.801	33
28	.122	.993	.375	.927	.602	.799	32
29	.126	.992	.379	.926	.605	.796	31
30	0.131	0.991	0.383	0.924	0.609	0.793	30
31	.135	.991	.387	.922	.612	.791	29
32	.139	.990	.391	.921	.616	.788	28
33	.143	.990	.395	.919	.619	.785	27
34	.148	.989	.399	.917	.623	.783	26
35	0.152	0.988	0.403	0.915	0.626	0.780	25
36	.156	.988	.407	.914	.629	.777	24
37	.161	.987	.411	.912	.633	.774	23
38	.165	.986	.415	.910	.636	.772	22
39	.169	.986	.419	.908	.639	.769	21
40	0.174	0.985	0.423	0.906	0.643	0.766	20
41	.178	.984	.427	.904	.646	.763	19
42	.182	.983	.431	.903	.649	.760	18
43	.187	.982	.434	.901	.653	.758	17
44	.191	.982	.438	.899	.656	.755	16
45	0.195	0.981	0.442	0.897	0.659	0.752	15
46	.199	.980	.446	.895	.663	.749	14
47	.204	.979	.450	.893	.666	.746	13
48	.208	.978	.454	.891	.669	.743	12
49	.212	.977	.458	.889	.672	.740	11
50	0.216	0.976	0.462	0.887	0.676	0.737	10
51	.221	.975	.466	.885	.679	.734	9
52	.225	.974	.469	.883	.682	.731	8
53	.229	.973	.473	.881	.685	.728	7
54	.233	.972	.477	.879	.688	.725	6
55	0.238	0.971	0.481	0.877	0.692	0.722	5
56	.242	.970	.485	.875	.695	.719	4
57	.246	.969	.489	.872	.698	.716	3
58	.250	.968	.492	.870	.701	.713	2
59	.255	.967	.496	.868	.704	.710	1
60	0.259	0.966	0.500	0.866	0.707	0.707	0
	Cos	Sin	Cos	Sin	Cos	Sin	m
	5 ^h		4 ^h		3 ^h		

MEAN PLACES OF STARS, 1931.

FOR JANUARY 1^d 322

Catalogue No.	Star's Name.	Mag.	Right Ascension.	Annual Variation.	Annual Proper Motion.	Declination.	Annual Variation.	Annual Proper Motion.
1504 ²	Ceti ...	4.62	^h 00 ^m 00 ^s 12.374	+3.0742	+0.0017	-17° 43' 11".86	+20".049	+0.001
3 ^a	Andromedæ	2.15	00 04 48.918	3.0977	+0.0094	+28 42 34.43	19.883	-0.157
4 ^β	Cassiopeia...	2.42	00 05 28.935	3.1921	+0.0665	+58 46 09.39	19.862	-0.177
10 ^γ	Pegasi ...	2.87	00 09 40.749	3.0872	-0.0006	+14 48 00.40	20.024	-0.002
16 ^ι	Ceti ...	3.75	00 15 54.727	3.0566	-0.0013	-9 12 22.33	19.974	-0.022
17 ^ζ	Tucanæ ...	4.34	00 16 29.366	+3.1387	+2.744	-65 16 48.43	+21.164	+1.171
18 ^δ	Piscium ...	5.58	00 17 02.650	3.0856	-0.0009	+7 48 26.00	20.007	+0.018
21 ⁴⁴	Piscium ...	5.99	00 21 51.839	3.0750	-0.0013	+1 33 28.27	19.950	-0.003
22 ^β	Hydri ...	2.90	00 22 09.276	3.1784	+0.6941	-77 38 34.29	20.263	+0.312
23 ^a	Phœnicis ...	2.44	00 22 52.678	2.9683	+0.0182	-42 40 49.64	19.559	-0.385
25 ¹²	Ceti ...	6.05	00 26 30.909	+3.0617	+0.0005	-4 20 17.93	+19.909	-0.001
35 ^ε	Andromedæ	4.52	00 34 54.182	3.1668	-0.0182	+28 56 14.78	19.568	-0.244
36 ^δ	Andromedæ	3.49	00 35 37.883	3.2040	+0.0092	+30 29 01.15	19.715	-0.087
37 ^a	Cassiopeia	Var.	00 36 34.663	3.3947	+0.0051	+56 09 33.56	19.766	-0.024
39 ^β	Ceti ...	2.24	00 40 07.608	3.0118	+0.0162	-18 21 54.04	19.781	+0.043
47 ^δ	Piscium ...	4.55	00 45 05.985	+3.1114	+0.0054	+7 12 35.62	+19.614	-0.043
52 ²⁰	Ceti ...	4.92	00 49 28.788	3.0653	0.0000	-1 31 06.75	19.574	-0.005
53 ^γ	Cassiopeia	2.25	00 52 31.592	3.6085	+0.0024	+60 20 36.81	19.520	0.000
55 ^μ	Andromedæ	3.94	00 52 54.908	3.3251	+0.0122	+38 07 31.74	19.540	+0.037
57 ^α	Sculptoris	4.39	00 55 16.947	2.8914	+0.0008	-29 43 47.79	19.476	+0.012
59 ^ε	Piscium ...	4.45	00 59 21.539	+3.1121	-0.0059	+7 31 08.72	+19.408	+0.032
61 ⁷²	Piscium ...	5.65	01 01 26.573	3.1654	+0.0004	+14 34 32.01	19.394	+0.066
63 ^β	Phœnicis <i>m</i> .	3.35	01 03 00.477	2.6791	-0.0035	-47 05 15.56	19.309	+0.018
69 ^β	Andromedæ	2.37	01 05 51.650	3.3544	+0.0138	+35 15 18.81	19.113	-0.109
74 ^ζ	Piscium ...	5.57	01 10 07.386	3.1333	+0.0094	+7 12 39.58	19.069	-0.044
81 ^θ	Ceti ...	3.83	01 20 34.413	+2.9984	-0.0054	-8 32 19.94	+18.611	-0.208
83 ^δ	Cassiopeia	2.80	01 21 16.999	3.9114	+0.0386	+59 52 38.68	18.756	-0.041
85 ^γ	Phœnicis ...	3.40	01 25 22.247	2.6062	-0.0025	-43 40 16.17	18.471	-0.198
88 ^η	Piscium ...	3.72	01 27 47.213	3.2082	+0.0015	+14 59 26.57	18.592	0.000
96 ^α	Eridani	0.60	01 35 08.841	2.2357	+0.0117	-57 35 12.39	18.316	-0.026
99 ^ν	Piscium ...	4.68	01 37 50.239	+3.1207	-0.0020	+5 08 20.99	+18.258	+0.013
104 ^o	Piscium ...	4.50	01 41 44.793	3.1665	+0.0046	+8 48 40.54	18.164	+0.063
109 ^ζ	Ceti ...	3.92	01 48 03.191	2.9607	+0.0021	-10 40 30.77	17.831	-0.027
110 ^α	Trianguli ...	3.58	01 49 08.475	3.4162	+0.0003	+29 14 36.37	17.583	-0.231
111 ^ε	Cassiopeia	3.44	01 49 24.478	4.2994	+0.0041	+63 19 52.43	17.788	-0.015
114 ^β	Arietis ...	2.72	01 50 49.390	+3.3113	+0.0065	+20 28 17.40	+17.642	-0.104
119 ^a	Hydri ...	3.02	01 56 35.776	1.8909	+0.0373	-61 54 17.99	17.545	+0.040
120 ^ν	Ceti ...	4.18	01 56 45.198	2.8261	+0.0088	-21 24 41.10	17.487	-0.012
124 ^γ	Andromedæ	2.28	01 59 39.256	3.6768	+0.0038	+41 59 58.40	17.329	-0.045
125 ^a	Arietis ...	2.23	02 03 16.672	3.3787	+0.0133	+23 08 13.28	17.072	-0.141
126 ^β	Trianguli ...	3.08	02 05 25.767	+3.5651	+0.0114	+34 39 42.61	+17.080	-0.036
130 ^ζ	Ceti ...	4.54	02 09 20.340	3.1782	-0.0018	+8 31 26.42	16.941	+0.005
133 ⁶⁷	Ceti ...	5.70	02 13 32.402	2.9920	+0.0060	-6 44 21.32	16.638	-0.098
134 ^φ	Eridani ...	3.78	02 14 02.661	+2.1431	+0.0088	-51 49 51.21	+16.697	-0.015

No. 10. *Algenib.*No. 25. 11^m, 10", 190°.No. 37. 2^m.1 to 2^m.6.No. 63. 4^m.1-4^m.1, 2", 0°.No. 74. 6^m.49 (ζ), 24", 64°.No. 96. *Achernar.*No. 124. 5^m.08 (γ), 10", 62°.

FOR JANUARY 1^d.322

Catalogue No.	Star's Name.	Mag.	Right Ascension.	Annual Variation.	Annual Proper Motion.	Declination.	Annual Variation.	Annual Proper Motion.
135	θ Arietis	5.69	02 14 16.927	+3.3345	-0.013	+19 34 58.45	+16.706	+ .005
136	ϕ Ceti	Var.	02 15 51.482	3.0292	-0.008	- 3 17 23.95	16.402	- .223
137	κ Fornacis	5.37	02 19 23.052	2.7444	+0.135	-24 07 44.93	16.389	- .061
138	δ Hydri	4.26	02 20 30.907	1.0636	-0.090	-68 58 23.09	16.406	+ .013
143	ξ^2 Ceti	4.34	02 24 29.196	3.1880	+0.022	+ 8 09 06.36	16.193	+ .002
150	ν Ceti	5.04	02 32 14.978	+3.1467	-0.025	+ 5 17 35.32	+15.767	- .015
154	δ Ceti	4.04	02 35 56.577	3.0739	+0.005	+ 0 01 54.79	15.590	+ .009
163	γ^2 Ceti	3.69	02 39 43.351	3.1073	-0.098	+ 2 56 45.73	15.231	- .139
164	π Ceti	4.39	02 40 50.235	2.8546	-0.008	-14 09 00.25	15.296	- .011
169	β Fornacis	4.50	02 46 12.103	2.5098	+0.058	-32 41 41.38	15.171	+ .171
170	σ Arietis	5.46	02 47 40.703	+3.3102	+0.014	+14 47 55.79	+14.894	- .020
175	ϵ Arietis <i>m.</i>	4.64	02 55 15.645	3.4275	-0.018	+21 03 55.76	14.463	.000
176	θ^1 Eridani	3.42	02 55 38.667	2.2739	-0.053	-40 34 49.11	14.471	+ .031
179	α Ceti	2.82	02 58 40.173	3.1347	-0.010	+ 3 49 12.51	14.187	- .068
181	γ Persei	3.08	02 59 47.064	4.3357	-0.009	+53 14 15.71	14.188	+ .001
182	ρ Persei	Var.	03 00 44.780	+3.8398	+0.108	+38 34 27.11	+14.024	- .103
183	μ Horologii	5.16	03 01 59.100	1.4123	-0.096	-60 00 17.09	14.002	- .048
185	β Persei	Var.	03 03 40.216	3.8981	-0.002	+40 41 28.17	13.948	+ .004
187	δ Arietis	4.53	03 07 40.706	3.4282	+0.103	+19 28 01.03	13.689	- .002
197	τ^1 Arietis	5.17	03 17 14.299	3.4615	+0.017	+20 53 58.36	13.045	- .023
200	α Persei	1.90	03 19 23.111	+4.2760	+0.023	+49 37 01.81	+12.905	- .020
201	ϕ Tauri	3.80	03 21 05.784	3.2267	-0.051	+ 8 47 14.21	12.743	- .068
207	f Tauri	4.28	03 27 03.574	3.3105	+0.010	+12 42 05.49	12.413	+ .008
210	ϵ Eridani	3.81	03 29 40.659	2.8256	-0.664	- 9 41 26.52	12.251	+ .026
211	δ^5 G Horologii	5.60	03 30 31.143	1.7871	+0.076	-50 36 43.18	12.257	+ .091
212	τ^5 Eridani	4.32	03 30 44.293	+2.6483	+0.018	-21 51 47.75	+12.129	- .021
217	η Tauri	6.15	03 36 38.702	3.5810	+0.005	+25 06 27.77	11.728	- .008
218	δ Persei	3.10	03 38 00.133	4.2658	+0.028	+47 34 06.81	11.609	- .030
221	δ Eridani	3.72	03 39 56.457	2.8736	-0.065	- 9 59 45.14	12.248	+ .747
224	η Tauri	3.81	03 40 46.363	3.5599	+0.008	+23 53 52.01	11.400	- .041
228	η Tauri	2.96	03 43 22.660	+3.5635	+0.008	+23 53 35.35	+11.213	- .041
234	ν Hydri	3.17	03 48 17.163	-0.9472	+0.108	-74 27 02.87	11.014	+ .118
235	ζ Persei	2.91	03 49 47.303	+3.7678	-0.002	+31 40 48.54	10.775	- .010
238	ϵ Persei	2.96	03 53 12.974	4.0221	+0.015	+39 48 43.97	10.511	- .021
240	ν Eridani	3.19	03 54 48.502	2.7983	+0.038	-13 42 13.15	10.308	- .105
241	λ Tauri	Var.	03 56 51.228	+3.3223	-0.009	+12 17 48.22	+10.253	- .007
244	A Tauri	4.50	04 00 36.664	3.5445	+0.058	+21 53 41.43	9.924	- .052
249	δ^3 Tauri	5.67	04 05 08.514	3.4933	+0.070	+19 25 41.72	9.606	- .024
251	ϕ^1 Eridani	4.14	04 08 29.702	2.9275	.0000	- 7 00 58.34	9.464	+ .092
256	α Horologii	3.83	04 11 42.778	1.9859	+0.020	-42 27 48.68	8.927	- .195
259	α Reticuli	3.36	04 13 31.823	+0.7684	+0.047	-62 38 46.27	+ 9.033	+ .052
261	ν^4 Eridani	3.59	04 15 16.906	2.2693	+0.042	-33 57 56.55	8.849	+ .006
262	γ Tauri	3.86	04 15 51.763	3.4123	+0.072	+15 27 44.92	8.780	- .018
270	ϵ Tauri	3.63	04 24 35.018	3.5014	+0.070	+19 01 44.01	8.074	- .032
278	α Tauri	1.06	04 31 57.484	+3.4408	+0.039	+16 22 19.36	+ 7.327	- .185

No. 136. *Mira*. 2^m.0 to 9^m.6.No. 176. 4^m.42 (θ^1), 8^m.5, 85°.No. 238. 7^m.93, 9°, 10°.No. 150. 10^m.8°, 83°.No. 182. 3^m.3 to 4^m.1.No. 241. 3^m.8 to 4^m.2.No. 163. 6^m.16 (γ^1), 3°, 290°.No. 185. *Algol*. 2^m.3 to 3^m.5.No. 278. *Aldebaran*.No. 175. 5^m.25-5^m.55, 1°4, 200°.No. 235. 9^m, 13°, 209°.

FOR JANUARY 1^d.322

Catalogue No.	Star's Name.	Mag.	Right Ascension.	Annual Variation.	Annual Proper Motion.	Declination.	Annual Variation.	Annual Proper Motion.
279	α Doradus ...	3.47	^h 04 ^m 32 ^s 30.143	+1.2945	+0.0049	-55 11 13.16	+7.473	+0.005
282	53 Eridani ...	3.98	04 35 01.144	2.7472	-0.0050	-14 26 15.46	7.112	-0.151
284	τ Tauri ...	4.33	04 38 05.984	3.5991	-0.0007	+22 49 34.17	7.002	-0.009
288	μ Eridani ...	4.18	04 42 03.002	2.9988	+0.0003	-3 22 47.36	6.678	-0.009
291	π^3 Orionis ...	3.31	04 46 05.515	3.2556	+0.0306	+6 50 32.16	6.375	+0.022
293	9 Camelopardi ...	4.38	04 47 10.576	+5.9553	+0.0005	+66 13 40.99	+6.271	+0.009
299	ι Aurigæ ...	2.90	04 52 29.740	3.9047	-0.0005	+33 03 30.88	5.806	-0.013
301	ϵ Aurigæ ...	Var.	04 57 00.750	4.3028	-0.0002	+43 43 23.24	5.438	-0.002
305	ι Tauri ...	4.70	04 58 58.066	3.5842	+0.0037	+21 29 34.69	5.233	-0.042
307	η Aurigæ ...	3.28	05 01 40.280	4.2047	+0.0019	+41 08 34.78	4.977	-0.069
308	ϵ Leporis ...	3.29	05 02 32.301	+2.5384	+0.0007	-22 27 45.23	+4.902	-0.071
310	β Eridani ...	2.92	05 04 27.341	2.9485	-0.0070	-5 10 27.51	4.735	-0.076
316	μ Leporis ...	3.30	05 09 49.767	2.6926	+0.0008	-16 17 09.48	4.328	-0.025
318	β Orionis ...	0.34	05 11 13.217	2.8822	-0.0006	-8 16 48.15	4.238	+0.004
319	α Aurigæ ...	0.21	05 11 35.276	4.4303	+0.0077	+45 55 47.51	3.782	-0.421
327	σ Orionis ...	4.65	05 18 14.265	+3.0619	-0.0008	-0 26 57.01	+3.637	+0.004
328	η Orionis <i>m</i> ...	3.44	05 21 00.325	3.0150	-0.0013	-2 27 33.62	3.391	-0.003
330	γ Orionis ...	1.70	05 21 25.690	3.2168	-0.0013	+6 17 19.29	3.351	-0.006
331	β Tauri ...	1.78	05 21 55.646	3.7912	+0.0013	+28 33 02.98	3.140	-0.174
333	β Leporis ...	2.96	05 25 17.211	2.5693	-0.0015	-20 48 47.68	2.940	-0.085
335	20 G Pictoris ...	5.54	05 28 15.536	+1.6484	+0.0011	-47 07 35.43	+2.639	-0.128
336	δ Orionis ...	2.48	05 28 28.785	3.0641	-0.0007	-0 20 55.57	2.754	+0.006
338	α Leporis ...	2.69	05 29 41.125	2.6452	-0.0007	-17 52 13.45	2.653	+0.010
343	ι Orionis ...	2.89	05 32 03.373	2.9340	-0.0006	-5 57 13.40	2.450	+0.013
344	ϵ Orionis ...	1.75	05 32 42.633	3.0433	-0.0008	-1 14 40.47	2.386	+0.004
345	β Doradus ...	3.81	05 33 01.345	+0.5168	-0.0031	-62 32 04.92	+2.358	+0.005
346	ζ Tauri ...	3.00	05 33 31.138	3.5848	-0.0004	+21 06 07.54	2.293	-0.018
349	α Columbæ ...	2.75	05 37 08.893	2.1709	-0.0015	-34 06 35.04	1.979	-0.016
350	ζ^1 Orionis ...	2.05	05 37 16.529	3.0264	-0.0006	-1 58 39.30	1.994	+0.009
354	130 Tauri ...	5.51	05 43 24.669	3.4971	-0.0013	+17 42 17.21	1.441	-0.008
357	κ Orionis ...	2.20	05 44 28.973	+2.8449	-0.0002	-9 41 34.25	+1.356	-0.000
362	β Columbæ ...	3.22	05 48 31.524	2.1132	+0.0026	-35 47 35.78	1.408	+0.404
365	α Orionis ...	Var.	05 51 26.097	3.2473	+0.0011	+7 23 44.52	0.763	+0.014
368	β Aurigæ ...	2.07	05 54 27.953	4.4002	-0.0059	+44 56 32.66	0.483	-0.001
369	θ Aurigæ ...	2.72	05 55 00.883	4.0907	+0.0034	+37 12 34.65	+0.360	-0.076
373	1 Geminorum ...	4.30	05 59 55.456	+3.6461	-0.0014	+23 16 07.32	-0.093	-0.100
377	ν Orionis ...	4.40	06 03 37.845	3.4248	-0.0006	+14 46 41.74	0.337	-0.019
381	η Geminorum ...	Var.	06 10 42.669	3.6208	-0.0058	+22 31 42.36	0.948	-0.011
389	ζ Canis Majoris ...	3.10	06 17 39.736	2.3012	-0.0015	-30 01 53.76	1.535	+0.008
390	μ Geminorum ...	3.19	06 18 47.113	3.6290	+0.0031	+22 33 02.27	1.752	-0.110
394	β Canis Majoris ...	1.99	06 19 39.582	+2.6411	-0.0013	-17 55 13.67	-1.714	+0.003
396	α Argus ...	-0.86	06 22 25.135	1.3308	+0.0009	-52 39 25.91	1.928	+0.030
399	ν Geminorum ...	4.06	06 24 51.920	3.5619	-0.0013	+20 15 26.71	2.182	-0.012
403	γ Geminorum ...	1.93	06 33 43.515	+3.4654	+0.0019	+16 27 34.93	-2.982	-0.043

No. 284. 8^m, 63^s, 213°.No. 301. 3^m.3 to 4^m.1.No. 318. *Rigel*. 6^m.66, 9^s, 200°.No. 319. *Capella*.No. 328. 3^m.8-5^m.0, 1^s, 80°.No. 330. *Bellatrix*.No. 333. 10^m, 3^s, 290°.No. 336. 6^m.87, 53^s, 359°.No. 343. 7^m.33, 11^s, 141°.No. 350. 4^m.21 (γ), 2^s.5, 160°.No. 365. *Betelgeuse*. 0^m.5-1^m.1.No. 369. 7^m.5, 2^s.5, 340°.No. 381. 3^m.3 to 4^m.2, 9^s, 1^s, 290°.No. 396. *Canopus*.

FOR JANUARY 1^d.322

Catalogue No.	Star's Name.	Mag.	Right Ascension.	Annual Variation.	Annual Proper Motion.	Declination.	Annual Variation.	Annual Proper Motion.
406	ν Argus ...	3.18	^h 06 ^m 35 ^s 38.914	+1.8346	—0.0015	—43° 08' 04".25	—3".106	—".001
408	ϵ Geminorum	3.18	06 39 41.198	3.6910	—0.0014	+25 12 03.79	3.467	—".013
409	ξ Geminorum	3.40	06 41 24.962	3.3667	—0.0090	+12 58 17.46	3.793	—".190
411	α Canis Maj.c.g.	—1.58	06 42 06.524	2.6434	—0.375	—16 37 12.96	4.870	—1.209
417	α Pictoris ...	3.30	06 47 28.986	0.6155	—0.0118	—61 52 00.80	3.856	+ ".267
419	τ Argus ...	2.83	06 48 13.332	+1.4867	+0.0008	—50 31 53.53	—4.245	—".058
422	θ Canis Majoris	4.25	06 50 58.986	2.7868	—0.0102	—11 57 03.41	4.436	—".013
426	ϵ Canis Majoris	1.63	06 55 54.759	2.3568	—0.0010	—28 52 37.58	4.840	+ ".002
427	22 Canis Majoris	3.68	06 58 58.126	2.3887	—0.0019	—27 50 06.04	5.104	—".003
428	ζ Geminorum	Var.	07 00 00.996	3.5585	—0.0015	+20 40 23.21	5.187	+ ".002
429	α^2 Canis Majoris	3.12	07 00 08.524	+2.5045	—0.0011	—23 43 52.89	—5.198	+ ".002
430	γ Canis Majoris	4.07	07 00 38.140	2.7137	—0.0008	—15 31 48.15	5.245	—".003
433	δ Canis Majoris	1.98	07 05 35.076	2.4385	—0.0014	—26 16 57.06	5.650	+ ".008
439	51 Geminorum	5.31	07 09 24.526	3.4450	—0.0003	+16 16 39.24	6.018	—".040
445	π Argus ...	2.74	07 14 42.373	2.1180	—0.0020	—36 58 20.76	6.399	+ ".019
447	δ Geminorum	3.52	07 16 00.149	+3.5833	—0.0029	+22 06 39.40	—6.535	—".010
449	δ Volantis ...	4.02	07 16 52.176	—0.0255	—0.0017	—67 49 51.18	6.594	+ ".004
452	η Canis Majoris	2.43	07 21 21.845	+2.3715	—0.0021	—29 10 03.05	6.964	+ ".003
453	β Canis Minoris	3.09	07 23 24.517	3.2532	—0.0047	+ 8 25 47.28	7.170	—".036
457	σ Argus ...	3.28	07 27 02.399	1.9013	—0.0077	—43 09 39.08	7.242	+ ".189
458	α Geminorum c.g.	1.58	07 30 11.900	+3.8311	—0.0142	+32 02 28.21	—7.790	—".103
463	Q Carinae ...	4.92	07 33 57.303	1.4843	+0.0017	—52 22 45.11	8.012	—".023
466	α Canis Min.c.g.	0.48	07 35 41.405	3.1399	—0.0485	+ 5 24 11.08	9.163	—1.035
468	26 Monocerotis	4.07	07 37 56.980	2.8656	—0.0062	— 9 23 20.30	8.328	—".019
470	β Geminorum	1.21	07 41 05.728	3.6723	—0.0484	+28 11 39.60	8.608	—".051
475	ξ Argus ...	3.47	07 46 23.459	+2.5222	—0.0015	—24 41 07.91	—8.975	—".001
478	9 Puppis m. ...	5.34	07 48 34.538	2.7776	—0.0051	—13 42 49.74	9.482	—".338
489	χ Geminorum	5.04	07 59 16.942	3.6862	—0.0029	+27 59 21.21	10.012	—".044
492	ξ Argus ...	2.27	08 01 09.478	2.1076	—0.0037	—39 48 28.04	10.089	+ ".021
495	ρ Argus ...	2.88	08 04 36.254	2.5540	—0.0073	—24 06 15.48	10.318	+ ".051
498	γ Argus ...	1.92	08 07 24.279	+1.8475	—0.0025	—47 07 56.76	—10.567	+ ".010
500	20 Puppis ...	5.05	08 10 09.607	2.7567	—0.0021	—15 34 44.95	10.776	+ ".005
503	β Cancri ...	3.76	08 12 46.433	3.2540	—0.0041	+ 9 23 58.14	11.019	—".045
507	d^1 Cancri ...	5.88	08 19 24.875	3.4366	—0.0044	+18 33 18.21	11.482	—".027
508	ϵ Argus ...	1.74	08 21 05.914	1.2314	—0.0051	—59 17 12.91	11.557	+ ".018
509	30 Monocerotis	3.95	08 22 12.751	+2.9976	—0.0054	— 3 40 48.92	—11.681	—".026
512	α Ursae Majoris	3.47	08 24 32.806	4.9972	—0.0187	+60 57 02.31	11.930	—".110
517	η Cancri ...	5.52	08 28 43.220	3.4707	—0.0040	+20 40 36.57	12.158	—".045
527	γ Cancri ...	4.73	08 39 17.709	3.4734	—0.0083	+21 43 04.31	12.876	—".039
529	α Pyxidis ...	3.70	08 40 49.060	2.4089	—0.0029	—32 56 11.95	12.919	+ ".020
531	δ Argus m. ...	2.01	08 42 47.853	+1.6554	+0.0004	—54 27 17.86	—13.144	—".073
532	ϵ Hydrae m. ...	3.53	08 43 07.372	3.1777	—0.0136	+ 6 40 23.00	13.142	—".050
539	ζ Hydrae ...	3.30	08 51 44.821	3.1718	—0.0076	+ 6 12 33.21	13.640	+ ".014
542	ι Ursae Majoris	3.12	08 54 29.518	4.1142	—0.0449	+48 18 50.10	14.066	—".238
543	α Cancri ...	4.27	08 54 42.873	+3.2817	+0.0012	+12 07 33.45	—13.873	—".031

No. 411. *Sirius*. —1^m.58—8^m.44,
10°, 46°.No. 426. 9^m, 8°, 161°.No. 428. 3^m.7 to 4^m.1. 8^m, 95°, 350°.No. 447. 8^m.5, 7°, 210°.No. 457. 8^m, 23°, 73°.No. 458. *Castor*. 1^m.99—2^m.85,
4°, 208°.No. 466. *Procyon*. 0^m.5—13^m.5,
3°, 275°.No. 470. *Pollux*.No. 478. 5^m.8—6^m.4 < 0°.7, 23
years.No. 498. 4^m.79, 41°, 220°.No. 531. 2^m.1—5^m.2, 3°, 165°.10^m, 70°, 60°.No. 532. 3^m.8—5^m.3, < 0°.5, 15years. 7^m, 3°, 250°.No. 542. 9^m, 7ⁿ.

Catalogue No.	Star's Name.	Mag.	Right Ascension.	Annual Variation.	Annual Proper Motion.	Declination.	Annual Variation.	Annual Proper Motion.
556	κ Cancri	5.14	09 04 00.658	+3.2501	-0.0023	+10 56 49.05	-14.426	-0.007
559	ξ Cancri	5.22	09 05 23.654	3.4507	-0.0009	+22 19 32.13	14.501	+0.003
560	λ Argus	2.22	09 05 27.363	2.2051	-0.0033	-43 09 11.56	14.492	+0.015
566	β Argus	1.80	09 12 27.055	0.6653	-0.0298	-69 25 57.96	14.819	+0.103
569	83 Cancri	6.60	09 15 07.926	3.3499	-0.0091	+17 59 55.79	15.212	-0.134
570	ι Argus	2.25	09 15 14.603	+1.6062	-0.0030	-58 59 06.69	-15.075	+0.009
571	40 Lyncis	3.30	09 16 51.394	3.6584	-0.0186	+34 41 07.47	15.160	+0.016
572	θ Pyxidis	4.93	09 18 26.185	2.6546	-0.0021	-25 40 15.46	15.276	-0.009
573	κ Argus	2.63	09 19 58.530	1.8566	-0.0024	-54 42 55.25	15.342	+0.011
576	α Hydrae	2.16	09 24 11.778	2.9478	-0.0017	-8 21 31.19	15.554	+0.034
580	ψ Argus m.	3.64	09 27 58.807	+2.3611	-0.0174	-40 09 49.96	-15.719	+0.075
583	ξ Leonis	5.12	09 28 13.680	3.2346	-0.0071	+11 36 22.83	15.886	-0.079
581	θ Ursae Majoris	3.26	09 28 15.176	4.0204	-0.0038	+51 59 34.39	16.351	-0.542
584	N Velorum	3.04	09 29 07.407	1.8212	-0.0058	-56 43 45.89	15.851	+0.004
593	κ Hydrae	4.96	09 36 59.824	2.8752	-0.0028	-14 01 06.64	16.289	-0.022
594	σ Leonis	3.76	09 37 28.150	+3.2026	-0.0105	+10 12 25.59	-16.326	-0.035
597	ϵ Leonis	3.12	09 41 56.264	3.4074	-0.0041	+24 05 34.24	16.528	-0.013
600	ν Argus	3.15	09 45 22.630	1.4997	-0.0029	-64 45 04.89	16.672	+0.013
601	ν Ursae Majoris	3.89	09 46 05.935	4.2784	-0.0391	+59 21 51.66	16.874	-0.155
603	μ Leonis	4.10	09 48 50.581	3.4144	-0.0166	+26 19 58.03	16.905	-0.054
612	π Leonis	4.89	09 56 34.081	+3.1709	-0.0029	+8 22 33.77	-17.228	-0.021
617	α Leonis	1.34	10 04 41.924	3.1956	-0.0178	+12 18 18.68	17.554	+0.007
619	q Velorum	4.09	10 11 50.147	2.5153	-0.0148	-41 46 46.20	17.807	+0.045
624	22 Sextantis	5.40	10 14 12.024	2.9809	-0.0113	-7 43 25.00	17.934	+0.012
625	q Carinae	3.44	10 14 46.615	2.0029	-0.0022	-60 59 13.50	17.962	+0.006
627	γ^1 Leonis	2.61	10 16 10.248	+3.3089	+0.0209	+20 11 28.17	-18.176	-0.154
628	μ Ursae Majoris	3.21	10 18 13.523	3.5793	-0.0078	+41 50 49.86	18.072	+0.028
633	μ Hydrae	4.06	10 22 45.088	2.9005	-0.0096	-16 29 00.46	18.345	-0.078
636	α Antliae	4.42	10 23 59.466	2.7427	-0.0073	-30 42 56.63	18.289	+0.022
641	ρ Leonis	3.85	10 29 10.732	3.1594	-0.0013	+9 39 44.04	18.493	-0.002
654	34 Sextantis	6.63	10 39 03.709	+3.0985	-0.0062	+3 56 38.72	-18.785	+0.022
656	θ Argus	3.03	10 40 29.432	2.1369	-0.0031	-64 01 56.86	18.831	+0.019
658	η Argus	Var.	10 42 22.714	2.3241	-0.0004	-59 19 16.74	18.902	+0.003
660	μ Argus	2.86	10 43 47.827	2.5768	+0.0066	-49 03 18.17	18.992	-0.045
662	l Leonis	5.27	10 45 37.860	3.1538	-0.0012	+10 54 38.96	19.020	-0.022
663	ν Hydrae	3.32	10 46 13.096	+2.9590	+0.0060	-15 49 55.53	-18.812	+0.203
668	ι Antliae	4.70	10 53 29.867	2.7928	+0.0056	-36 45 58.73	19.330	-0.123
672	d Leonis	5.05	10 56 59.821	3.0984	+0.0002	+3 59 18.24	19.305	-0.013
674	β Ursae Majoris	2.44	10 57 41.391	3.6297	+0.0094	+56 45 09.94	19.272	+0.036
675	α Ursae Majoris	1.95	10 59 29.098	3.7141	-0.0181	+62 07 26.12	19.417	-0.068
677	χ Leonis	4.66	11 01 27.483	+3.0948	-0.0238	+7 42 33.78	-19.441	-0.047
680	ψ Ursae Majoris	3.15	11 05 47.454	3.3777	-0.0069	+44 52 23.67	19.515	-0.030
682	β Crateris	4.52	11 08 15.662	2.9485	-0.0008	-22 26 55.60	19.634	-0.099
683	δ Leonis	2.58	11 10 26.444	+3.1920	+0.0096	+20 54 07.34	-19.712	-0.134

No. 580. $3^m.8-5^m.8, 0^s.5, 200^s$,
30 years.

No. 584. *Vierteljahrsschrift*
gives $3^m.4$ to $4^m.2$.

No. 600. $6^m.03, 5^s, 128^s$.

No. 617. *Regulus*.

No. 627. $3^m.80 (\gamma^2), 5^s, 130^s$.

No. 658. -1^m to $7^m.8$.

No. 660. $7^m, 2^s, 70^s$.

No. 675. *Dubhe*.

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Catalogue No.	Star's Name.	Mag.	Right Ascension.	Annual Variation.	Annual Proper Motion.	Declination.	Annual Variation.	Annual Proper Motion.
684	θ Leonis	3.41	11 10 37.226	+3.1487	-0.0051	+15 48 25.24	-19.660	-0.080
690	δ Crateris	3.82	11 15 53.314	2.9982	-0.0091	-14 24 17.50	19.469	+0.204
697	τ Leonis	5.18	11 24 23.300	3.0851	+0.0005	+3 14 11.28	19.815	-0.012
701	λ Draconis	4.06	11 27 19.758	3.5786	-0.0079	+69 42 43.72	19.858	-0.017
702	ξ Hydrae	3.72	11 29 36.189	2.9474	-0.0173	-31 28 32.08	19.909	-0.041
704	λ Centauri	3.34	11 32 35.374	+2.7598	-0.0050	-62 38 16.24	-19.911	-0.010
706	ν Leonis	4.47	11 33 24.889	3.0712	-0.0005	-0 26 33.42	19.866	+0.044
712	ν Virginis	4.20	11 42 18.737	3.0834	-0.0020	+6 54 58.02	20.170	-0.185
717	β Leonis	2.23	11 45 32.449	3.0604	-0.0350	+14 57 28.14	20.121	-0.117
718	β Virginis	3.80	11 47 06.010	3.1246	+0.0489	+2 09 13.30	20.280	-0.268
719	B Centauri	4.71	11 47 41.267	+2.9935	-0.0082	-44 47 22.06	-20.031	-0.016
722	γ Ursae Majoris	2.54	11 50 12.557	3.1616	+0.0099	+54 04 42.74	20.013	+0.013
726	π Virginis	4.57	11 57 20.198	3.0741	-0.0007	+6 59 56.88	20.070	-0.027
730	σ Virginis	4.24	12 01 41.637	3.0558	-0.0155	+9 06 58.65	19.991	+0.052
733	δ Centauri	2.88	12 04 46.422	3.1020	-0.0045	-50 20 17.23	20.054	-0.014
735	ϵ Corvi	3.21	12 06 34.319	+3.0832	-0.0054	-22 14 09.44	-20.021	+0.015
738	δ Crucis	3.48	12 11 28.163	3.1759	-0.0055	-58 21 54.10	20.025	-0.006
739	δ Ursae Majoris	3.04	12 12 01.076	2.9747	+0.0114	+57 24 57.06	20.013	+0.003
740	γ Corvi	2.78	12 12 15.238	3.0832	-0.0118	-17 09 31.92	19.994	+0.022
742	β Chamæleontis	4.38	12 14 15.681	3.4856	-0.0120	-78 55 45.24	19.998	+0.008
744	η Virginis	4.00	12 16 22.444	+3.0685	-0.0049	-0 17 00.34	-20.012	-0.018
748	α Crucis	1.58	12 22 44.729	3.3244	-0.0052	-62 43 00.57	19.967	-0.021
755	δ Corvi	3.11	12 26 17.407	3.1018	-0.0153	-16 07 53.06	20.049	-0.137
757	γ Crucis	1.61	12 27 19.563	3.3171	+0.0020	-56 43 36.83	20.164	-0.262
760	κ Draconis	3.88	12 30 32.860	2.5688	-0.0117	+70 10 06.03	19.861	+0.006
761	β Corvi	2.84	12 30 45.478	+3.1484	-0.0005	-23 00 55.10	-19.919	-0.055
764	α Muscae	2.94	12 33 02.897	3.5597	-0.0071	-68 45 19.89	19.851	-0.015
768	γ Centauri <i>m</i> ...	2.38	12 37 42.079	3.3004	-0.0205	-48 34 51.38	19.781	-0.007
769	γ Virginis <i>m</i> ...	2.91	12 38 09.682	3.0385	-0.0386	-1 04 16.05	19.751	+0.016
770	ρ Virginis	4.95	12 38 23.474	3.0359	+0.0048	+10 36 56.31	19.856	-0.092
773	β Muscae <i>m</i> ...	3.26	12 42 01.717	+3.6624	-0.0056	-67 43 50.25	-19.727	-0.019
775	β Crucis	1.50	12 43 40.537	3.4936	-0.0058	-59 18 42.34	19.697	-0.015
776	γ Virginis	6.66	12 44 20.514	3.0541	-0.0010	+3 56 57.15	19.674	-0.004
778	γ Comae	5.07	12 48 20.314	2.9229	-0.0018	+27 54 56.97	19.616	-0.016
781	ψ Virginis	4.91	12 50 45.674	3.1180	-0.0023	-9 09 52.22	19.572	-0.017
782	ϵ Ursae Majoris	1.68	12 50 59.919	+2.6432	+0.0131	+56 20 03.11	-19.550	0.000
784	δ Virginis	3.66	12 52 07.565	3.0210	-0.0321	+3 46 19.71	19.581	-0.052
786	γ Canum Ven.	2.90	12 52 48.138	2.8076	-0.0209	+38 41 26.23	19.464	+0.051
787	δ Muscae	3.63	12 57 29.789	4.1025	+0.0564	-71 10 38.05	19.453	-0.037
788	ϵ Virginis	2.95	12 58 44.462	2.9857	-0.0194	+11 19 47.01	19.364	+0.026
792	θ Virginis	4.46	13 06 22.460	+3.1045	-0.0030	-5 10 13.47	-19.239	-0.029
802	γ Hydrae	3.33	13 15 09.918	3.2581	+0.0042	-22 48 28.89	19.027	-0.052
803	ι Centauri	2.91	13 16 42.646	3.3670	-0.0289	-36 20 55.58	19.018	-0.086
805	ζ Ursae Majoris	2.40	13 21 08.995	2.4176	+0.0134	+55 17 06.81	18.828	-0.027
806	α Virginis	1.21	13 21 33.263	+3.1583	-0.0034	-10 48 05.99	-18.819	-0.030

No. 697. 7^m, 92", 175°.No. 717. *Denebola*.No. 748. 2^m.09 (α), 5", 118°.No. 755. 8^m, 24", 214°.No. 768. 3^m.1-3^m.1, 1", 335°.No. 769. 3^m.65-3^m.68, 6", 321°.No. 773. 3^m.9-4^m.2, 1", 355°.No. 786. 5^m.39 (121), 20", 227°.No. 792. 9^m.7, 344", 10^m, 71", 300°.No. 805. 3^m.96 (ζ), 15", 150°.No. 806. *Spica*.

MEAN PLACES OF STARS, 1931.

FOR JANUARY 1^d.322

Catalogue No.	Star's Name.	Mag.	Right Ascension.	Annual Variation.	Annual Proper Motion.	Declination.	Annual Variation.	Annual Proper Motion.
807	<i>i</i> Virginis ...	5.59	13 23 04.199	+3.1668	-.0099	-12 20 56.88	-18.763	-.021
814	<i>ζ</i> Virginis ...	3.44	13 31 10.482	3.0555	-.0196	- 0 14 37.32	18.439	+ .040
819	<i>ε</i> Centauri ...	2.56	13 35 30.188	3.7906	-.0031	-53 06 57.74	18.337	-.008
821	<i>m</i> Virginis ...	5.16	13 37 59.219	3.1471	-.0072	- 8 21 19.35	18.198	+ .042
824	<i>τ</i> Bootis ...	4.51	13 43 58.934	2.8504	-.0345	+17 48 00.21	17.980	+ .037
826	<i>η</i> Ursæ Majoris	1.91	13 44 49.375	+2.3648	-.0133	+49 39 25.95	-17.994	-.011
828	<i>μ</i> Centauri ...	3.32	13 45 27.064	3.6076	-.0021	-42 07 50.31	17.984	-.024
831	<i>ζ</i> Centauri ...	3.06	13 51 13.466	3.7338	-.0064	-46 56 57.31	17.767	-.038
832	<i>η</i> . Bootis ...	2.80	13 51 23.880	2.8556	-.0055	+18 44 34.53	18.084	-.361
839	<i>τ</i> Virginis ...	4.34	13 58 07.937	3.0518	+ .0005	+ 1 52 40.08	17.457	-.018
841	<i>β</i> Centauri ...	0.86	13 58 56.187	+4.2191	-.0036	-60 02 27.55	-17.428	-.023
842	<i>π</i> Hydræ ...	3.48	14 02 26.146	3.4123	+ .0023	-26 21 01.99	17.384	-.133
845	<i>α</i> Draconis ...	3.64	14 02 31.128	1.6230	-.0093	+64 42 18.58	17.234	+ .013
843	<i>θ</i> Centauri ...	2.26	14 02 36.857	3.5253	-.0432	-36 01 52.56	17.763	-.519
844	94 Virginis ...	6.56	14 02 38.318	3.1751	-.0004	- 8 33 46.28	17.210	+ .032
849	<i>κ</i> Virginis ...	4.31	14 09 12.656	+3.1980	-.0002	- 9 57 11.95	-16.803	+ .139
852	<i>α</i> Bootis ...	0.24	14 12 30.758	2.7351	-.0786	+19 32 27.49	18.781	-1.995
860	2 Libræ ...	6.30	14 19 42.583	3.2256	-.0016	-11 23 59.01	16.494	-.061
863	<i>f</i> Bootis ...	5.36	14 23 14.684	2.7893	-.0062	+19 32 10.75	16.231	+ .024
869	<i>ρ</i> Bootis ...	3.78	14 28 51.305	2.5846	-.0089	+30 40 24.64	15.846	+ .117
870	<i>γ</i> Bootis ...	3.00	14 29 17.929	+2.4151	-.0107	+38 36 33.77	-15.787	+ .153
873	<i>η</i> Centauri ...	2.65	14 31 07.002	3.8028	-.0035	-41 51 20.49	15.869	-.027
875	<i>α</i> Centauri <i>c.g.</i>	0.06	14 34 53.809	4.0629	-.4906	-60 33 05.49	14.913	+ .724
877	<i>α</i> Circini ...	3.42	14 36 54.503	4.8299	-.0288	-64 40 33.92	15.772	-.245
878	<i>α</i> Lupi ...	2.89	14 37 19.773	3.9812	-.0029	-47 05 34.86	15.521	-.017
881	<i>α</i> Apodis ...	3.81	14 39 12.132	+7.3751	+ .0003	-78 45 14.32	-15.427	-.028
885	<i>ε</i> Bootis ...	2.70	14 41 58.337	2.6190	-.0048	+27 21 51.50	15.223	+ .020
891	<i>α</i> Libræ ...	2.90	14 47 03.402	+3.3161	-.0079	-15 45 21.64	15.017	-.067
896	<i>β</i> Ursæ Minoris	2.24	14 50 53.130	-0.1912	-.0089	+74 26 15.04	14.718	+ .008
899	<i>ξ</i> Libræ ...	5.63	14 53 01.198	+3.2530	-.0001	-11 07 55.95	14.591	+ .007
901	<i>β</i> Lupi ...	2.81	14 54 00.159	+3.9216	-.0048	-42 51 25.53	-14.579	-.040
902	<i>κ</i> Centauri ...	3.35	14 54 39.799	3.8962	-.0025	-41 49 42.21	14.522	-.023
906	<i>β</i> Bootis ...	3.63	14 59 20.727	2.2588	-.0048	+40 39 43.09	14.243	-.029
907	<i>γ</i> Scorpil ...	3.41	15 00 01.536	3.5078	-.0061	-25 00 42.73	14.217	-.045
910	<i>ψ</i> Bootis ...	4.67	15 01 29.224	2.5694	-.0145	+27 12 56.86	14.089	-.008
914	<i>ζ</i> Lupi ...	3.50	15 07 18.912	+4.2996	-.0135	-51 50 16.54	-13.782	-.068
915	<i>ι</i> Libræ ...	4.66	15 08 16.962	3.4163	-.0037	-19 31 54.15	13.694	-.042
918	<i>γ</i> Triang. Aust.	3.06	15 12 26.394	5.5777	-.0111	-68 25 34.84	13.410	-.026
919	<i>δ</i> Bootis ...	3.54	15 12 43.124	2.4171	+ .0051	+33 34 16.76	13.482	-.117
920	<i>β</i> Libræ ...	2.74	15 13 17.399	3.2259	-.0074	- 9 07 45.82	13.347	-.018
923	<i>δ</i> Lupi ...	3.43	15 16 50.115	+3.9328	-.0011	-40 23 56.04	-13.116	-.021
926	<i>α</i> Libræ ...	6.74	15 19 10.614	+3.3441	-.0002	-14 53 19.92	12.921	+ .018
928	<i>γ</i> Ursæ Minoris	3.14	15 20 49.242	-0.1076	-.0057	+72 04 46.25	12.813	+ .016
931	<i>ι</i> Draconis ...	3.47	15 23 23.399	+1.3317	-.0024	+59 12 26.05	-12.641	+ .015

No. 839. 9^m, 80°, 290°.
No. 852. *Arcturus*.

No. 875. 0^m.33-1^m.70, 6°, 259°.
No. 877. 8^m.83, 16°, 240°.

No. 885. 5^m.12, 3°, 330°.
No. 915. 10^m, 58°, 110°.

FOR JANUARY 1^d.322

Catalogue No.	Star's Name.	Mag.	Right Ascension.	Annual Variation.	Annual Proper Motion.	Declination.	Annual Variation.	Annual Proper Motion.
933	32 Libræ ...	5.92	^h 15 ^m 24 ^s 21.624	+3.3808	+0.0003	-16 28 37.36	-12.620	-0.030
941	γ Lupi m. ...	2.95	15 30 32.071	3.9919	-0.0022	-40 56 09.65	12.186	-0.021
943	α Coronæ Bor.	2.31	15 31 45.870	2.5388	+0.0079	+26 56 45.32	12.171	-0.092
951	α Serpēntis ...	2.75	15 40 52.000	2.9534	+0.0082	+ 6 38 29.73	11.386	+0.048
955	μ Serpēntis ...	3.63	15 46 00.972	+3.1292	-0.0064	- 3 13 13.02	11.088	-0.026
957	ζ Ursæ Minoris	4.34	15 46 28.813	-2.1758	+0.0044	+78 00 27.19	-11.032	-0.004
958	ε Serpēntis ...	3.75	15 47 22.432	+2.9891	+0.0078	+ 4 41 03.39	10.898	+0.065
959	β Triang. Aust.	3.04	15 49 02.665	5.2711	-0.0289	-63 13 10.31	11.237	-0.397
963	γ Serpēntis ...	3.86	15 53 15.804	2.7696	+0.0203	+15 53 08.43	11.814	-1.286
964	π Scorpii ...	3.00	15 54 40.336	3.6256	-0.0020	-25 55 00.23	10.446	-0.023
967	δ Scorpii ...	2.54	15 56 14.912	+3.5442	-0.0017	-22 25 35.80	-10.326	-0.021
972	β ¹ Scorpii ...	2.90	16 01 25.238	3.4858	-0.0010	-19 37 04.40	9.932	-0.018
983	δ Ophiuchi ...	3.03	16 10 43.601	3.1422	-0.0037	- 3 31 04.59	9.341	-1.42
987	ε Ophiuchi ...	3.34	16 14 40.045	3.1727	+0.0050	- 4 31 32.02	8.848	+0.043
986	γ ² Normæ ...	4.14	16 14 40.104	4.4827	-0.0169	-49 59 16.93	8.953	-0.061
989	σ Scorpii ...	3.10	16 16 59.370	+3.6433	-0.0018	-25 25 42.99	- 8.729	-0.020
992	γ Herculis ...	3.79	16 18 52.438	2.6451	-0.0043	+19 18 50.49	8.516	+0.044
998	γ Apodis ...	3.90	16 22 48.267	9.1498	-0.0435	-78 44 44.59	8.320	-0.072
1001	η Draconis ...	2.89	16 23 03.041	0.8084	-0.0044	+61 40 12.09	8.168	+0.060
1002	α Scorpii ...	1.22	16 25 10.345	3.6758	-0.0013	-26 16 49.08	8.077	-0.018
1005	β Herculis ...	2.81	16 27 15.096	+2.5777	-0.0079	+21 38 19.76	- 7.908	-0.016
1006	λ Ophiuchi m.	3.85	16 27 25.850	3.0244	-0.0028	+ 2 08 01.61	7.946	-0.068
1008	τ Scorpii ...	2.91	16 31 34.946	3.7318	-0.0015	-28 04 27.57	7.564	-0.021
1013	ζ Ophiuchi ...	2.70	16 33 21.383	3.3019	+0.0004	-10 25 43.36	7.371	+0.028
1016	24 Scorpii ...	5.04	16 37 34.713	3.4676	-0.0023	-17 36 36.16	7.053	+0.001
1017	ζ Herculis o.g.	3.00	16 38 40.982	+2.2601	-0.0381	+31 43 36.40	- 6.571	+0.393
1018	η Herculis ...	3.61	16 40 31.684	2.0551	+0.0018	+39 03 08.99	6.900	-0.088
1019	α Triang. Aust.	1.88	16 41 20.484	6.3388	+0.0042	-68 54 12.83	6.783	-0.037
1023	ε Scorpii ...	2.36	16 45 41.410	3.8831	-0.0496	-34 10 10.17	6.633	-0.247
1024	20 Ophiuchi ...	4.73	16 46 00.811	3.3171	+0.0056	-10 39 44.58	6.453	-0.094
1026	μ ¹ Scorpii ...	3.09	16 47 11.483	+4.0603	-0.0019	-37 55 50.10	- 6.286	-0.025
1031	ζ Aræ ...	3.06	16 52 54.151	4.9594	-0.0020	-55 52 59.04	5.813	-0.029
1034	κ Ophiuchi ...	3.42	16 54 24.005	2.8384	-0.0205	+ 9 28 51.79	5.666	-0.007
1035	30 Ophiuchi ...	5.00	16 57 25.104	3.1616	-0.0041	- 4 07 13.47	5.473	-0.068
1036	ε Herculis ...	3.92	16 57 38.834	2.2937	-0.0050	+31 01 37.04	5.359	+0.028
1040	η Ophiuchi m.	2.63	17 06 25.100	+3.4390	+0.0022	-15 38 27.30	- 4.547	+0.097
1041	η Scorpii ...	3.44	17 07 12.354	4.2930	+0.0005	-43 08 59.65	4.861	-0.285
1042	ζ Draconis ...	3.22	17 08 34.893	0.1701	-0.0040	+65 47 58.26	4.437	+0.022
1045	α ¹ Herculis ...	Var.	17 11 29.962	2.7344	-0.0014	+14 28 04.09	4.172	+0.039
1046	δ Herculis ...	3.16	17 12 11.719	2.4628	-0.0028	+24 55 09.74	4.311	-0.160
1047	π Herculis ...	3.36	17 12 38.498	+2.0881	-0.0033	+36 53 09.29	- 4.110	+0.002
1052	θ Ophiuchi ...	3.37	17 17 46.153	3.6828	-0.0008	-24 55 55.84	3.690	-0.018
1055	β Aræ ...	2.80	17 19 33.523	4.9831	-0.0015	-55 28 00.17	3.548	-0.029
1060	σ Ophiuchi ...	4.44	17 23 05.329	2.9753	-0.0008	+ 4 11 56.60	3.201	+0.013
1063	ν Scorpii ...	2.80	17 26 04.219	+4.0778	+0.0002	-37 14 32.57	- 2.985	-0.028

No. 941. 3^m.6-3^m.8, 0°.5±, at times single.

No. 972. 10^m, 1°, 94°.

5^m.06 (β²), 13°, 25°.

No. 986. 9^m, 42°, 5°.

No. 989. 8^m, 21°, 272°.

No. 992. 9^m, 41°, 235°.

No. 1001. 8^m, 5°, 5, 145°.

No. 1002. *Antares*. 7^m, 3°, 273°.

No. 1006. 4^m.0-6^m.1, 0°.4, 105°.

(1925), 304° (1930).

No. 1017. 3^m.0-6^m.5, 1°, 11°.

No. 1026. μ² fol. 0^m.5, 1°.7n.

No. 1040. 3^m.2-3^m.7, 0°.6, 230°.

No. 1045. 3^m.1 to 3^m.9. 5^m.39.

(α²), 4°.7, 114°.

No. 1046. 8^m, 10°, 210°.

MEAN PLACES OF STARS, 1931.

FOR JANUARY 1^d.322

Cata- logue No.	Star's Name.	Mag.	Right Ascension.	Annual Variation.	Annual Proper Motion.	Declination.	Annual Variation.	Annual Proper Motion.
1064	<i>a</i> Aræ ...	2.97	^h 17 ^m 26 ^s 30.248	+4.6352	^s -0.0034	^o -49 ['] 49 ["] 23.84	- 2.988	- .069
1067	<i>β</i> Draconis ...	2.99	17 28 52.275	1.3540	-0.0027	+52 21 06.60	2.700	+ .014
1066	<i>λ</i> Scorpii ...	1.71	17 28 55.221	4.0718	-0.0008	-37 03 18.42	2.734	- .024
1070	<i>a</i> Ophiuchi ...	2.14	17 31 43.778	2.7835	+0.0072	+12 36 32.42	2.691	- .225
1071	<i>θ</i> Scorpii ...	2.04	17 32 21.448	4.3083	+0.0003	-42 57 20.22	2.411	+ .001
1075	<i>κ</i> Scorpii ...	2.51	17 37 42.695	+4.1480	-0.0017	-38 59 46.09	- 1.972	- .026
1079	<i>η</i> Pavonis ...	3.58	17 38 57.402	5.8860	-0.0010	-64 41 35.60	1.893	- .055
1080	<i>β</i> Ophiuchi ...	2.94	17 40 03.725	2.9624	-0.0036	+ 4 35 41.27	1.578	+ .164
1081	<i>ε</i> Scorpii ...	3.14	17 42 45.376	4.1942	-0.0008	-40 06 06.95	1.505	+ .001
1084	<i>μ</i> Herculis ...	3.48	17 43 45.359	2.3468	-0.0245	+27 45 36.19	2.159	- .739
1086	<i>σ</i> Scorpii ...	3.25	17 45 09.660	+4.0847	+0.0061	-37 01 22.74	- 1.266	+ .031
1091	89 Herculis ...	5.48	17 52 38.031	2.4187	-0.0010	+26 03 35.77	0.632	+ .012
1095	<i>γ</i> Draconis ...	2.42	17 55 00.102	1.3913	-0.0023	+51 29 46.92	0.455	- .018
1096	<i>ν</i> Ophiuchi ...	3.50	17 55 13.595	3.3019	-0.0009	- 9 45 59.71	0.532	- .115
1103	<i>γ</i> Sagittarii ...	3.07	18 01 22.468	3.8535	-0.0042	-30 25 35.51	- 0.066	- .186
1105	72 Ophiuchi ...	3.73	18 04 04.625	+2.8436	-0.0045	+ 9 33 10.06	+ 0.444	+ .087
1109	<i>μ</i> Sagittarii ...	4.01	18 09 38.154	3.5872	-0.0003	-21 04 42.42	0.844	+ .002
1111	<i>η</i> Sagittarii ...	3.16	18 12 57.453	4.0587	-0.0117	-36 47 02.56	0.972	- .160
1114	<i>δ</i> Sagittarii ...	2.84	18 16 34.567	3.8402	+0.0022	-29 51 32.41	1.425	- .023
1116	<i>η</i> Serpentis ...	3.42	18 17 44.294	3.1034	-0.0375	- 2 55 05.10	0.859	- .691
1118	<i>ε</i> Sagittarii ...	1.95	18 19 35.528	+3.9819	-0.0033	-34 25 08.10	+ 1.588	- .124
1120	<i>a</i> Telescopii ...	3.76	18 21 51.484	+4.4497	-0.0011	-46 00 29.50	1.864	- .045
1123	<i>χ</i> Draconis ...	3.69	18 22 18.065	-1.0819	+0.1161	+72 42 12.17	1.586	- .362
1125	<i>λ</i> Sagittarii ...	2.94	18 23 42.711	+3.7019	-0.0039	-25 27 40.80	1.891	- .179
1131	<i>a</i> Lyræ ...	0.14	18 34 36.060	2.0303	+0.0164	+38 43 06.47	3.299	+ .284
1133	<i>ζ</i> Pavonis ...	4.10	18 34 59.039	+7.0187	+0.0009	-71 29 24.81	+ 2.882	- .166
1136	<i>4</i> H Scuti ...	4.74	18 38 29.702	3.2847	+0.0003	- 9 07 11.69	3.355	+ .004
1138	<i>φ</i> Sagittarii ...	3.30	18 41 20.742	3.7479	+0.0034	-27 03 47.69	3.600	+ .004
1145	<i>λ</i> Pavonis ...	4.42	18 45 49.752	5.5628	-0.0013	-62 16 08.05	3.965	- .017
1146	30 Sagittarii ...	6.24	18 46 41.576	3.6050	-0.0031	-22 14 33.57	4.023	- .033
1147	<i>β</i> Lyræ ...	Var.	18 47 31.845	+2.2138	-0.0008	+33 16 53.57	+ 4.126	- .001
1150	<i>σ</i> Sagittarii ...	2.14	18 50 59.245	3.7201	+0.0006	-26 23 02.06	4.374	- .049
1155	<i>ξ</i> Sagittarii ...	3.61	18 53 36.812	3.5788	+0.0017	-21 11 55.81	4.635	- .011
1157	<i>γ</i> Lyræ ...	3.30	18 56 21.650	2.2430	-0.0013	+32 35 37.93	4.882	+ .002
1158	<i>ε</i> Aquilæ ...	4.21	18 56 29.368	2.7218	-0.0045	+14 58 24.25	4.822	- .069
1159	<i>ζ</i> Sagittarii <i>m</i>	2.71	18 58 13.341	+3.8168	-0.0022	-29 58 49.29	+ 5.038	+ .001
1160	<i>ζ</i> Aquilæ ...	3.02	19 02 14.257	2.7565	-0.0012	+13 45 34.94	5.285	- .091
1162	<i>λ</i> Aquilæ ...	3.55	19 02 35.195	3.1831	-0.0021	- 4 59 14.52	5.321	- .085
1161	<i>τ</i> Sagittarii ...	3.42	19 02 37.975	3.7456	-0.0049	-27 46 22.15	5.160	- .249
1163	<i>a</i> Coronæ Aust. ...	4.12	19 04 46.797	4.0826	+0.0066	-38 00 48.87	5.491	- .099
1166	<i>π</i> Sagittarii ...	3.02	19 05 39.668	+3.5681	-0.0003	-21 08 05.33	+ 5.630	- .035
1172	<i>ψ</i> Sagittarii ...	4.93	19 11 18.645	3.6793	+0.0030	-25 22 37.43	6.115	- .022
1173	<i>δ</i> Draconis ...	3.24	19 12 32.583	0.0169	+0.0159	+67 32 24.67	6.332	+ .093
1177	<i>ω</i> Aquilæ ...	5.14	19 14 34.588	+2.8152	-0.0008	+11 28 11.29	+ 6.428	+ .020

No. 1084. 9^m.5, 33", 245°.No. 1134. *Vega*.No. 1159. 3^m.4-3^m.6, <1", 21 years.No. 1109. 10^m, 17", 258°; 10^m,49", 312°; 10^m, 50", 115°.No. 1147. 3^m.4 to 4^m.1. 7^m,46", 149°; 9^m, 67", 318°;9^m, 86", 19°.

MEAN PLACES OF STARS, 1951.

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FOR JANUARY 1^d.322

Catalogue No.	Star's Name.	Mag.	Right Ascension.	Annual Variation.	Annual Proper Motion.	Declination.	Annual Variation.	Annual Proper Motion.
1185	δ Aquilæ ...	3.44	^h 19 22 ^m 01.135	^s +3.0245	^s +.0166	+ 2 58 33.41	+ 7.110	+ .088
1186	59 G Telescopii ...	5.58	19 22 16.070	4.8276	+ .0030	-54 27 53.73	7.035	- .006
1190	6 Vulpeculæ ...	4.63	19 25 49.955	2.4953	- .0102	+24 31 26.68	7.227	- .105
1193	β Cygni ...	3.24	19 27 56.238	2.4185	- .0008	+27 48 49.16	7.499	- .004
1197	μ Aquilæ ...	4.65	19 30 43.056	2.9299	+ .0135	+ 7 13 52.56	7.580	- .149
1198	h Sagittarii ...	4.66	19 32 30.608	+3.6520	+ .0050	-25 02 14.16	+ 7.858	- .015
1203	54 Sagittarii ...	5.45	19 36 46.280	3.4375	+ .0047	-16 27 09.60	8.179	- .035
1211	f Sagittarii ...	5.06	19 42 20.310	3.5002	- .0096	-19 55 41.98	8.574	- .081
1213	δ Cygni ...	2.98	19 42 49.020	1.8741	+ .0036	+44 57 41.63	8.742	+ .048
1214	γ Aquilæ ...	2.80	19 42 58.718	2.8515	+ .0005	+10 26 38.36	8.712	+ .006
1218	α Aquilæ ...	0.89	19 47 24.975	+2.9264	+ .0356	+ 8 41 05.92	+ 9.447	+ .392
1219	ε Draconis ...	4.03	19 48 24.872	-0.1973	+ .0144	+70 05 32.23	9.169	+ .037
1221	ε Sagittarii ...	4.21	19 50 30.366	+4.1425	+ .0016	-42 03 03.65	9.358	+ .063
1222	β Aquilæ ...	3.90	19 51 55.398	2.9463	+ .0023	+ 6 13 59.72	8.930	- .475
1223	ε Pavonis ...	4.10	19 52 38.618	6.9663	+ .0169	-73 05 43.36	9.311	- .149
1227	g Sagittarii ...	5.05	19 54 02.296	+3.4032	+ .0007	-15 40 32.97	+ 9.474	- .093
1231	c Sagittarii ...	4.60	19 58 25.082	3.6905	+ .0024	-27 54 10.69	9.927	+ .025
1233	δ Pavonis ...	3.64	20 01 58.499	5.9013	+ .1978	-66 21 36.26	9.024	- .147
1237	θ Aquilæ ...	3.37	20 07 44.693	3.0951	+ .0019	- 1 01 38.30	10.614	+ .011
1250	4 Capricorni ...	5.96	20 13 58.299	3.5262	+ .0025	-22 01 28.08	11.029	- .032
1251	α ³ Capricorni ...	3.77	20 14 13.647	+3.3291	+ .0040	-12 45 35.76	+11.090	+ .010
1252	β Capricorni ...	3.25	20 17 08.173	3.3714	+ .0026	-15 00 01.83	11.298	+ .007
1255	γ Cygni ...	2.32	20 19 45.037	2.1524	- .0002	+40 02 05.68	11.478	- .001
1256	α Pavonis ...	2.12	20 20 12.023	4.7554	+ .0007	-56 57 27.93	11.430	- .081
1258	ρ Capricorni ...	5.06	20 24 55.581	3.4226	- .0014	-18 02 34.46	11.834	- .013
1267	ε Delphini ...	3.98	20 29 54.943	+2.8655	.0000	+11 04 03.97	+12.183	- .014
1270	α Indi ...	3.21	20 32 43.335	4.2262	+ .0056	-47 32 00.17	12.466	+ .076
1277	α Delphini ...	3.86	20 36 25.930	2.7860	+ .0039	+15 40 03.77	12.650	+ .006
1279	β Pavonis ...	3.60	20 38 45.812	5.4260	- .0064	-66 27 09.81	12.824	+ .023
1281	α Cygni ...	1.33	20 39 04.671	2.0438	- .0008	+45 01 58.89	12.827	+ .605
1284	ε Cygni ...	2.64	20 43 25.040	+2.4262	+ .0276	+33 42 39.30	+13.442	+ .330
1288	η Cephei ...	3.59	20 43 53.306	1.2218	+ .0126	+61 34 13.40	13.066	+ .823
1287	ε Aquarii ...	3.83	20 43 56.517	3.2481	+ .0019	- 9 44 57.91	13.119	- .027
1293	μ Aquarii ...	4.80	20 48 56.002	3.2364	+ .0025	- 9 14 35.62	13.451	- .022
1296	32 Vulpeculæ ...	5.24	20 51 37.038	2.5560	- .0010	+27 47 39.63	13.650	+ .004
1301	γ Microscopii ...	4.71	20 57 03.811	+3.6834	+ .0002	-32 31 42.94	+13.906	+ .005
1305	θ Capricorni ...	4.19	21 02 04.243	3.3738	+ .0056	-17 30 28.86	14.249	- .052
1308	61 Cygni ...	5.57	21 03 48.122	2.6892	+ .3529	+38 24 33.15	17.664	+3.257
1314	ζ Cygni ...	3.40	21 09 59.847	2.5519	- .0009	+29 56 35.27	14.728	- .050
1318	α Equulei ...	4.14	21 12 22.472	2.9989	+ .0035	+ 4 57 42.10	14.837	- .080
1323	θ Microscopii ...	4.92	21 16 21.245	+3.8432	+ .0069	-41 06 08.22	+15.140	- .002
1324	α Cephei ...	2.60	21 16 55.957	1.4318	+ .0204	+62 17 34.06	15.232	+ .051
1325	ζ Capricorni ...	4.30	21 18 24.424	3.3419	+ .0021	-17 07 45.68	15.275	+ .010
1327	γ Pavonis ...	4.30	21 20 45.788	4.9815	+ .0156	-65 40 47.40	16.194	+ .796
1328	ζ Capricorni ...	3.86	21 22 43.854	+3.4271	- .0002	-22 42 39.89	+15.539	+ .031

No. 1186. 8^m, 69", 250°.

No. 1193. 5^m.36 (β³), 35", 55°.

No. 1203. 9^m, 46", 42°.

No. 1213. 8^m, 1", 7, 270°.

No. 1218. *Allair*.

No. 1219. 8^m, 3ⁿ.

No. 1258. 7^m.5, 3", 170°.

No. 1281. *Deneb*.

No. 1308. 6^m.28 (β¹²), 25", 136°

FOR JANUARY 1^d.322

Catalogue No.	Star's Name.	Mag.	Right Ascension.	Annual Variation.	Annual Proper Motion.	Declination.	Annual Variation.	Annual Proper Motion.
			^h ^m ^s	^s	^s	[°] ['] ["]	["]	["]
1333	β Cephei ...	3.33	21 27 46.590	+0.7792	+0.0014	+70 15 27.77	+15.797	+0.014
1332	β Aquarii ...	3.07	21 27 55.646	3.1585	+0.0009	- 5 52 31.92	15.793	+0.001
1338	ξ Aquarii ...	4.78	21 34 04.782	3.1943	+0.0074	- 8 09 52.10	16.099	-0.018
1345	ϵ Pegasi ...	2.54	21 40 47.771	2.9458	+0.0013	+ 9 33 28.61	16.469	+0.010
1349	δ Capricorni...	2.98	21 43 14.082	3.3125	+0.0179	-16 26 28.03	16.294	-0.286
1356	γ Gruis ...	3.16	21 49 45.414	+3.6369	+0.0084	-37 41 24.32	+16.888	-0.006
1357	16 Pegasi ...	5.05	21 49 55.164	2.7268	-0.0019	+25 35 59.33	16.905	+0.004
1370	α Aquarii ...	3.19	22 02 14.414	3.0814	+0.0009	- 0 39 20.44	17.457	+0.001
1375	ϵ Pegasi ...	3.96	22 03 47.753	2.7911	+0.0209	+25 00 27.02	17.555	+0.032
1374	α Gruis ...	2.16	22 03 53.596	3.7875	+0.0120	-47 17 44.77	17.387	-0.140
1381	ζ Cephei ...	3.62	22 08 27.400	+2.0792	+0.0011	+57 51 38.92	+17.734	+0.017
1386	θ Aquarii ...	4.32	22 13 11.618	3.1663	+0.0076	- 8 07 38.83	17.894	-0.013
1387	α Tucanæ ...	2.91	22 13 47.482	4.1244	-0.0088	-60 36 15.07	17.898	-0.024
1391	γ Aquarii ...	3.97	22 18 05.557	3.0988	+0.0084	- 1 44 07.91	18.114	+0.019
1404	σ Aquarii ...	4.89	22 26 59.814	3.1756	-0.0002	-11 01 53.71	18.393	-0.023
1409	η Aquarii ...	4.13	22 31 48.638	+3.0826	+0.0056	- 0 28 24.97	+18.533	-0.046
1410	κ Aquarii ...	5.33	22 34 11.007	3.1075	-0.0046	- 4 35 03.99	18.542	-0.113
1415	ζ Pegasi ...	3.61	22 38 01.146	2.9912	+0.0047	+10 28 14.79	18.774	-0.002
1416	β Gruis ...	2.24	22 38 33.366	3.5895	+0.0137	-47 14 45.25	18.789	-0.003
1418	η Pegasi ...	3.10	22 39 45.830	2.8100	+0.0002	+29 51 35.87	18.809	-0.019
1421	ϵ Gruis ...	3.69	22 44 23.799	+3.6318	+0.0112	-51 40 48.31	+18.909	-0.055
1423	μ Pegasi ...	3.67	22 46 40.171	2.8937	+0.0100	+24 14 12.76	18.992	-0.035
1424	ι Cephei ...	3.68	22 47 13.101	2.1320	-0.0108	+65 50 14.26	18.925	-0.117
1428	λ Aquarii ...	3.84	22 49 00.913	3.1298	+0.0001	- 7 56 49.69	19.135	+0.044
1430	δ Aquarii ...	3.51	22 50 59.425	3.1852	-0.0028	-16 11 17.40	19.125	-0.018
1431	α Piscis Aust.	1.29	22 53 50.509	+3.3173	+0.0249	-29 59 17.85	+19.056	-0.159
1436	β Piscium ...	4.58	23 00 21.857	3.0523	+0.0001	+ 3 26 53.79	19.369	0.000
1437	β Pegasi ...	2.61	23 00 25.510	2.9059	+0.0134	+27 42 29.77	19.518	+0.147
1438	α Pegasi ...	2.57	23 01 19.282	2.9869	+0.0036	+14 50 01.33	19.356	-0.035
1444	c^3 Aquarii ...	3.80	23 05 46.211	3.2005	+0.0039	-21 32 49.87	19.527	+0.041
1452	γ Tucanæ ...	4.10	23 13 24.885	+3.5116	-0.0035	-58 36 51.10	+19.726	+0.094
1453	γ Piscium ...	3.85	23 13 35.247	3.1095	+0.0503	+ 2 54 18.33	19.664	+0.029
1455	ψ^3 Aquarii ...	5.16	23 15 22.353	3.1209	+0.0025	- 9 59 17.09	19.678	+0.012
1457	τ Pegasi ...	4.65	23 17 13.076	2.9670	+0.0012	+23 21 44.98	19.695	-0.001
1464	κ Piscium ...	4.94	23 23 23.659	3.0749	+0.0053	+ 0 52 39.80	19.703	-0.086
1471	72 Pegasi m	5.21	23 30 31.488	+2.9735	+0.0034	+30 56 39.67	+19.868	-0.011
1474	ι Phœnicis ...	4.80	23 31 22.213	3.2327	+0.0045	-42 59 48.16	19.895	+0.007
1479	ι Piscium ...	4.28	23 36 23.981	3.0849	+0.0240	+ 5 15 08.08	19.510	-0.428
1480	γ Cephei ...	3.42	23 36 29.773	2.4466	-0.0219	+77 14 49.83	20.092	+0.153
1482	λ Piscium ...	4.61	23 38 31.470	3.0606	-0.0093	+ 1 24 01.09	19.815	-0.141
1488	δ Sculptoris...	4.64	23 45 20.084	+3.1271	+0.0077	-28 30 42.51	+19.909	-0.094
1491	ϕ Pegasi ...	5.23	23 48 58.449	3.0505	-0.0006	+18 44 13.70	19.994	-0.027
1498	27 Piscium ...	5.07	23 55 08.407	3.0713	-0.0036	- 3 56 19.57	19.974	-0.066
1500	ω Piscium ...	4.03	23 55 45.964	+3.0798	+0.0097	+ 6 28 52.90	+19.936	-0.105

No. 1333. 8^m, 13^s, 250°.No. 1418. 9^m, 91^s, 339°.No. 1431. *Fomalhaut*.No. 1438. *Markab*.No. 1471. 6^m.0-6^m.0, 0^s.4, 200°.No. 1488. 9^m, 74^s, 297°.No. 1498. 10^m, 2^s, 270°.

FOR JANUARY 1^d.322

CIRCUMPOLAR STARS.

Catalogue No.	Star's Name.	Mag.	Right Ascension.	Annual Variation.	Annual Proper Motion.	Declination.	Annual Variation.	Annual Proper Motion.
13	o Octantis ...	7.22	^h 00 ^m 12 ^s 16.306	— 0.1755	+ .0204	— 88° 44' 47.80"	+ 20.020	+ .004
95	a Ursæ Minoris	2.12	01 37 26.423	+ 32.8561	+ .1738	+ 88 56 00.84	+ 18.257	— .002
149	9 B Octantis	7.76	02 30 49.510	— 8.6946	— .0021	— 86 01 34.72	+ 15.839	— .019
173	10B Octantis	8.35	02 47 03.969	— 29.8112	— .0303	— 88 26 53.13	+ 14.928	— .022
359	31G Mensæ ...	6.24	05 43 31.770	— 11.6485	— .0058	— 84 49 28.94	+ 1.488	+ .049
374	12B Octantis	6.74	05 58 01.626	— 15.7428	— .0230	— 85 55 58.43	+ 0.177	+ .004
434	51H Cephei ...	5.26	07 08 50.159	+ 28.7539	— .0474	+ 87 09 34.94	— 5.967	— .037
462	A Octantis ...	7.75	07 28 50.716	— 49.3432	— .0315	— 88 38 49.71	— 7.564	+ .013
511	4 B Ursæ Min.	7.01	08 29 16.541	+ 55.4529	— .0118	+ 88 50 16.72	— 12.139	+ .012
649	10G Octantis	6.74	10 35 15.389	— 3.4026	— .0020	— 85 44 01.01	— 18.686	+ .003
676	η Octantis ...	6.26	10 59 50.562	— 0.4005	— .0462	— 84 13 21.75	— 19.365	— .007
743	6 B Ursæ Min.	6.28	12 14 34.898	+ 0.4752	— .0601	+ 88 04 56.57	— 19.951	+ .053
855	δ Octantis ...	4.14	14 15 38.359	+ 9.4159	— .0552	— 83 21 14.75	— 16.646	— .011
909	57B Ursæ Min.	7.16	14 59 14.976	— 18.5078	— .0261	+ 87 29 53.29	— 14.197	+ .023
935	ρ Octantis ...	5.66	15 27 05.675	+ 13.5738	+ .0940	— 84 14 23.90	— 12.313	+ .090
1032	ε Ursæ Minoris	4.40	16 52 58.218	— 6.2061	+ .0059	+ 82 09 12.77	— 5.777	+ .002
1097	δ Ursæ Minoris	4.44	17 54 28.218	— 19.4880	+ .0134	+ 86 36 47.92	— 0.432	+ .051
1153	λ Ursæ Minoris	6.55	18 45 30.400	— 74.8526	— .1076	+ 89 02 07.96	+ 3.960	+ .006
1212	44G Octantis	6.32	19 43 25.197	+ 11.1528	+ .0080	— 81 31 36.68	+ 8.745	+ .004
1207	σ Octantis ...	5.48	19 48 59.914	+ 87.4526	+ .1223	— 89 11 31.98	+ 9.175	— .003
1260	48G Octantis	7.08	20 26 26.942	+ 14.5651	+ .0459	— 84 38 47.39	+ 11.940	— .015
1321	Groomb. 3548	7.36	21 13 21.768	— 12.5782	+ .0110	+ 86 45 14.87	+ 14.990	+ .014
1390	v Octantis ...	5.74	22 18 58.363	+ 11.9028	— .0360	— 86 19 13.50	+ 18.197	+ .069
1417	β Octantis ...	4.34	22 39 07.169	+ 6.2302	— .0259	— 81 44 38.95	+ 18.815	+ .007
1468	39H Cephei ...	5.62	23 27 41.539	— 0.3283	+ .0960	+ 86 55 36.88	+ 19.865	+ .020

No. 95. *Polaris*. 8^m.79, 18°, 215°.

AT UPPER TRANSIT AT GREENWICH.

 α Ursæ Minoris (*Polaris*). Mag. 2.12

Day.	JANUARY.		FEBRUARY.		MARCH.		APRIL.		MAY.		JUNE.	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ^m ^s [°] [']	[°] ['] ⁺	^h ^m ^s [°] [']	[°] ['] ⁺	^h ^m ^s [°] [']	[°] ['] ⁺	^h ^m ^s [°] [']	[°] ['] ⁺	^h ^m ^s [°] [']	[°] ['] ⁺	^h ^m ^s [°] [']	[°] ['] ⁺
	01 36 88 56		01 36 88 56		01 35 88 56		01 35 88 56		01 35 88 55		01 36 88 55	
1	^s 75.39	^s 21.95	^s 40.25	^s 23.53	^s 71.91	^s 19.68	^s 54.64	^s 11.45	^s 58.01	^s 62.40	^s 20.43	^s 55.42
2	74.47	22.12	39.02	23.53	70.94	19.51	54.36	11.12	58.61	62.10	21.48	55.29
3	73.49	22.29	37.73	23.49	69.96	19.31	54.20	10.77	59.26	61.82	22.47	55.18
4	72.42	22.45	36.43	23.42	69.00	19.08	54.15	10.43	59.92	61.56	23.38	55.07
5	71.26	22.62	35.16	23.32	68.12	18.83	54.19	10.11	60.55	61.33	24.24	54.96
6	70.02	22.77	33.97	23.21	67.35	18.56	54.26	09.80	61.13	61.11	25.08	54.83
7	68.72	22.89	32.88	23.08	66.67	18.28	54.33	09.50	61.66	60.88	25.92	54.69
8	67.42	23.00	31.87	22.95	66.08	18.02	54.36	09.23	62.13	60.65	26.78	54.54
9	66.16	23.08	30.93	22.83	65.56	17.76	54.34	08.97	62.57	60.41	27.71	54.38
10	64.97	23.14	30.03	22.72	65.06	17.52	54.27	08.70	63.00	60.16	28.70	54.21
11	63.87	23.19	29.13	22.61	64.53	17.29	54.15	08.43	63.45	59.90	29.75	54.04
12	62.85	23.24	28.19	22.51	63.96	17.06	54.02	08.15	63.95	59.64	30.88	53.89
13	61.86	23.30	27.19	22.41	63.33	16.83	53.91	07.84	64.51	59.37	32.08	53.77
14	60.88	23.37	26.13	22.31	62.66	16.60	53.83	07.51	65.14	59.08	33.31	53.60
15	59.88	23.44	25.00	22.21	61.96	16.35	53.80	07.18	65.86	58.80	34.55	53.58
16	58.82	23.52	23.84	22.08	61.26	16.09	53.84	06.85	66.67	58.53	35.77	53.52
17	57.68	23.61	22.69	21.93	60.54	15.82	53.96	06.52	67.53	58.28	36.93	53.48
18	56.47	23.68	21.53	21.76	59.86	15.53	54.17	06.18	68.42	58.06	38.01	53.44
19	55.20	23.74	20.41	21.58	59.25	15.22	54.46	05.85	69.32	57.86	39.01	53.40
20	53.88	23.78	19.36	21.38	58.73	14.90	54.81	05.53	70.18	57.67	39.96	53.35
21	52.56	23.80	18.39	21.17	58.28	14.57	55.18	05.23	70.99	57.49	40.90	53.30
22	51.25	23.80	17.49	20.95	57.91	14.25	55.56	04.95	71.72	57.32	41.87	53.23
23	49.97	23.77	16.67	20.74	57.63	13.95	55.89	04.69	72.39	57.15	42.92	53.14
24	48.74	23.73	15.91	20.53	57.40	13.66	56.15	04.44	73.03	56.98	44.06	53.04
25	47.58	23.67	15.18	20.34	57.18	13.37	56.34	04.19	73.70	56.79	45.30	52.96
26	46.49	23.62	14.44	20.17	56.93	13.11	56.50	03.93	74.42	56.58	46.62	52.90
27	45.46	23.58	13.66	20.01	56.64	12.86	56.66	03.65	75.23	56.36	47.97	52.86
28	44.48	23.54	12.82	19.85	56.29	12.62	56.85	03.35	76.14	56.13	49.31	52.85
29	43.50	23.52	11.91	19.68	55.88	12.37	57.13	03.04	77.16	55.92	50.60	52.87
30	42.50	23.53			55.44	12.09	57.51	02.72	78.24	55.73	51.82	52.90
31	41.41	23.53			55.01	11.78	58.01	02.40	79.35	55.57	52.97	52.93
32	40.25	23.53			54.64	11.45			80.43	55.42		

Mean R.A. 01^h 37^m 26^s.423 Mean Dec. +88° 56' 00".84 Sec δ 53.73 Tan δ +53.72

AT UPPER TRANSIT AT GREENWICH.

α Ursæ Minoris (*Polaris*). Mag. 2.12

Day.	JULY.		AUGUST.		SEPTEMBER.		OCTOBER.		NOVEMBER.		DECEMBER.	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ₀₁ ^m ₃₆ ^s _{88° 55'}	+	^h ₀₁ ^m ₃₇ ^s _{88° 55'}	+	^h ₀₁ ^m ₃₈ ^s _{88° 56'}	+	^h ₀₁ ^m ₃₈ ^s _{88° 56'}	+	^h ₀₁ ^m ₃₈ ^s _{88° 56'}	+	^h ₀₁ ^m ₃₇ ^s _{88° 56'}	+
1	^s _{52.97}	^s _{52.93}	^s _{29.36}	^s _{55.34}	^s _{01.56}	^s _{02.30}	^s _{22.89}	^s _{12.28}	^s _{29.67}	^s _{24.66}	^s _{77.97}	^s _{35.28}
2	^s _{54.05}	^s _{52.96}	^s _{30.39}	^s _{55.48}	^s _{02.52}	^s _{02.55}	^s _{23.52}	^s _{12.66}	^s _{29.46}	^s _{25.08}	^s _{77.13}	^s _{35.57}
3	^s _{55.10}	^s _{52.98}	^s _{31.45}	^s _{55.61}	^s _{03.52}	^s _{02.81}	^s _{24.12}	^s _{13.05}	^s _{29.17}	^s _{25.48}	^s _{76.34}	^s _{35.85}
4	^s _{56.13}	^s _{52.99}	^s _{32.55}	^s _{55.74}	^s _{04.54}	^s _{03.10}	^s _{24.65}	^s _{13.46}	^s _{28.84}	^s _{25.86}	^s _{75.61}	^s _{36.11}
5	^s _{57.17}	^s _{52.98}	^s _{33.72}	^s _{55.87}	^s _{05.55}	^s _{03.42}	^s _{25.09}	^s _{13.88}	^s _{28.52}	^s _{26.21}	^s _{74.95}	^s _{36.37}
6	^s _{58.24}	^s _{52.97}	^s _{34.94}	^s _{56.01}	^s _{06.53}	^s _{03.75}	^s _{25.43}	^s _{14.30}	^s _{28.25}	^s _{26.55}	^s _{74.36}	^s _{36.63}
7	^s _{59.36}	^s _{52.95}	^s _{36.21}	^s _{56.17}	^s _{07.43}	^s _{04.10}	^s _{25.69}	^s _{14.70}	^s _{28.05}	^s _{26.88}	^s _{73.80}	^s _{36.90}
8	^s _{60.55}	^s _{52.94}	^s _{37.49}	^s _{56.36}	^s _{08.24}	^s _{04.45}	^s _{25.88}	^s _{15.10}	^s _{27.92}	^s _{27.22}	^s _{73.23}	^s _{37.18}
9	^s _{61.80}	^s _{52.93}	^s _{38.76}	^s _{56.57}	^s _{08.96}	^s _{04.80}	^s _{26.05}	^s _{15.48}	^s _{27.85}	^s _{27.58}	^s _{72.62}	^s _{37.48}
10	^s _{63.11}	^s _{52.94}	^s _{39.97}	^s _{56.80}	^s _{09.61}	^s _{05.15}	^s _{26.26}	^s _{15.84}	^s _{27.78}	^s _{27.95}	^s _{71.92}	^s _{37.80}
11	^s _{64.47}	^s _{52.97}	^s _{41.12}	^s _{57.04}	^s _{10.21}	^s _{05.48}	^s _{26.53}	^s _{16.18}	^s _{27.69}	^s _{28.34}	^s _{71.12}	^s _{38.11}
12	^s _{65.83}	^s _{53.03}	^s _{42.18}	^s _{57.29}	^s _{10.82}	^s _{05.80}	^s _{26.87}	^s _{16.52}	^s _{27.54}	^s _{28.75}	^s _{70.22}	^s _{38.41}
13	^s _{67.17}	^s _{53.11}	^s _{43.15}	^s _{57.54}	^s _{11.48}	^s _{06.10}	^s _{27.28}	^s _{16.88}	^s _{27.29}	^s _{29.15}	^s _{69.24}	^s _{38.69}
14	^s _{68.46}	^s _{53.20}	^s _{44.06}	^s _{57.78}	^s _{12.21}	^s _{06.40}	^s _{27.73}	^s _{17.26}	^s _{26.92}	^s _{29.55}	^s _{68.23}	^s _{38.95}
15	^s _{69.67}	^s _{53.31}	^s _{44.96}	^s _{58.01}	^s _{13.01}	^s _{06.70}	^s _{28.18}	^s _{17.65}	^s _{26.46}	^s _{29.95}	^s _{67.21}	^s _{39.19}
16	^s _{70.81}	^s _{53.44}	^s _{45.87}	^s _{58.21}	^s _{13.87}	^s _{07.00}	^s _{28.58}	^s _{18.06}	^s _{25.94}	^s _{30.32}	^s _{66.20}	^s _{39.41}
17	^s _{71.86}	^s _{53.56}	^s _{46.85}	^s _{58.42}	^s _{14.76}	^s _{07.33}	^s _{28.89} _{29.10}	^s _{18.49} _{18.92}	^s _{25.39}	^s _{30.66}	^s _{65.23}	^s _{39.62}
18	^s _{72.88}	^s _{53.65}	^s _{47.92}	^s _{58.61}	^s _{15.64}	^s _{07.68}	^s _{29.21}	^s _{19.34}	^s _{24.83}	^s _{30.99}	^s _{64.30}	^s _{39.81}
19	^s _{73.91}	^s _{53.72}	^s _{49.07}	^s _{58.82}	^s _{16.45}	^s _{08.05}	^s _{29.26}	^s _{19.75}	^s _{24.28}	^s _{31.31}	^s _{63.42}	^s _{40.01}
20	^s _{74.99}	^s _{53.78}	^s _{50.26}	^s _{59.05}	^s _{17.17}	^s _{08.44}	^s _{29.22}	^s _{20.14}	^s _{23.78}	^s _{31.63}	^s _{62.59}	^s _{40.20}
21	^s _{76.15}	^s _{53.84}	^s _{51.47}	^s _{59.29}	^s _{17.80}	^s _{08.83}	^s _{29.18}	^s _{20.51}	^s _{23.32}	^s _{31.93}	^s _{61.77}	^s _{40.39}
22	^s _{77.40}	^s _{53.90}	^s _{52.66}	^s _{59.55}	^s _{18.34}	^s _{09.22}	^s _{29.13}	^s _{20.88}	^s _{22.90}	^s _{32.23}	^s _{60.96}	^s _{40.59}
23	^s _{78.72}	^s _{53.98}	^s _{53.77}	^s _{59.83}	^s _{18.80}	^s _{09.59}	^s _{29.13}	^s _{21.23}	^s _{22.52}	^s _{32.54}	^s _{60.13}	^s _{40.81}
24	^s _{80.09}	^s _{54.08}	^s _{54.79}	^s _{60.12}	^s _{19.23}	^s _{09.95}	^s _{29.16}	^s _{21.58}	^s _{22.15}	^s _{32.87}	^s _{59.26}	^s _{41.04}
25	^s _{81.46}	^s _{54.20}	^s _{55.71}	^s _{60.42}	^s _{19.65}	^s _{10.29}	^s _{29.22}	^s _{21.93}	^s _{21.76}	^s _{33.21}	^s _{58.30}	^s _{41.27}
26	^s _{82.80}	^s _{54.35}	^s _{56.57}	^s _{60.73}	^s _{20.09}	^s _{10.64}	^s _{29.33}	^s _{22.27}	^s _{21.34}	^s _{33.56}	^s _{57.24}	^s _{41.50}
27	^s _{84.06}	^s _{54.52}	^s _{57.38}	^s _{61.01}	^s _{20.57}	^s _{10.96}	^s _{29.47}	^s _{22.63}	^s _{20.84}	^s _{33.91}	^s _{56.10}	^s _{41.73}
28	^s _{85.23}	^s _{54.70}	^s _{58.17}	^s _{61.28}	^s _{21.10}	^s _{11.27}	^s _{29.61}	^s _{23.01}	^s _{20.25}	^s _{34.27}	^s _{54.91}	^s _{41.93}
29	^s _{86.32}	^s _{54.88}	^s _{58.97}	^s _{61.54}	^s _{21.66}	^s _{11.59}	^s _{29.74}	^s _{23.41}	^s _{19.56}	^s _{34.62}	^s _{53.70}	^s _{42.10}
30	^s _{87.36}	^s _{55.04}	^s _{59.78}	^s _{61.80}	^s _{22.26}	^s _{11.93}	^s _{29.80}	^s _{23.83}	^s _{18.79}	^s _{34.97}	^s _{52.50}	^s _{42.24}
31	^s _{88.36}	^s _{55.20}	^s _{60.64}	^s _{62.05}	^s _{22.89}	^s _{12.28}	^s _{29.78}	^s _{24.25}	^s _{17.97}	^s _{35.28}	^s _{51.36}	^s _{42.36}
32	^s _{89.36}	^s _{55.34}	^s _{61.56}	^s _{62.30}			^s _{29.67}	^s _{24.66}			^s _{50.31}	^s _{42.47}

Catalogue Number 95

Spectrum F8

AT UPPER TRANSIT AT GREENWICH.

51 H Cephei. Mag. 5.26

Day.	JANUARY.		FEBRUARY.		MARCH.		APRIL.		MAY.		JUNE.	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ^m ^s	[°] ['] [″]	^h ^m ^s	[°] ['] [″]	^h ^m ^s	[°] ['] [″]	^h ^m ^s	[°] ['] [″]	^h ^m ^s	[°] ['] [″]	^h ^m ^s	[°] ['] [″]
	07 09	87 09	07 09	87 09	07 09	87 09	07 08	87 09	07 08	87 09	07 08	87 09
1	17.38	40.24	18.51	50.29	12.34	57.57	60.72	61.38	48.94	59.46	40.84	52.65
2	17.55	40.51	18.45	50.62	12.06	57.81	60.25	61.41	48.57	59.27	40.74	52.36
3	17.76	40.78	18.35	50.97	11.74	58.06	59.78	61.41	48.24	59.06	40.66	52.08
4	17.98	41.06	18.21	51.32	11.38	58.30	59.34	61.38	47.95	58.86	40.56	51.83
5	18.20	41.38	18.03	51.65	11.00	58.50	58.91	61.33	47.68	58.67	40.44	51.59
6	18.40	41.72	17.82	51.95	10.60	58.68	58.52	61.27	47.41	58.49	40.31	51.34
7	18.57	42.09	17.59	52.23	10.21	58.83	58.15	61.22	47.14	58.33	40.16	51.10
8	^(18.70) ^(18.77)	^(42.46) ^(42.82)	17.37	52.48	09.83	58.95	57.81	61.20	46.87	58.18	40.00	50.84
9	18.81	43.17	17.18	52.71	09.46	59.06	57.46	61.18	46.58	58.04	39.83	50.57
10	18.83	43.49	17.00	52.94	09.14	59.17	57.11	61.18	46.26	57.90	39.65	50.29
11	18.85	43.79	16.84	53.18	08.83	59.29	56.74	61.18	45.93	57.75	39.49	49.99
12	18.88	44.07	16.69	53.44	08.52	59.43	56.35	61.18	45.59	57.59	39.36	49.66
13	18.93	44.35	16.54	53.71	08.20	59.59	55.93	61.18	45.24	57.40	39.26	49.33
14	18.99	44.62	16.38	54.00	07.87	59.75	55.49	61.17	44.90	57.19	39.18	48.98
15	19.07	44.90	16.19	54.30	07.52	59.92	55.04	61.13	44.56	56.96	39.14	48.64
16	19.16	45.22	15.97	54.60	07.14	60.09	54.58	61.08	44.25	56.71	39.14	48.31
17	19.24	45.55	15.72	54.90	06.73	60.25	54.13	61.01	43.97	56.45	39.16	48.01
18	19.29	45.89	15.45	55.19	06.31	60.39	53.68	60.91	43.72	56.19	39.18	47.72
19	19.32	46.25	15.15	55.46	05.86	60.52	53.26	60.79	43.51	55.93	39.19	47.44
20	19.33	46.62	14.83	55.72	05.40	60.62	52.88	60.66	43.32	55.69	39.18	47.17
21	19.29	46.98	14.50	55.95	04.95	60.70	52.52	60.53	43.15	55.47	39.13	46.91
22	19.23	47.33	14.17	56.16	04.50	60.75	52.19	60.42	42.98	55.25	39.07	46.63
23	19.14	47.66	13.85	56.37	04.09	60.80	51.88	60.31	42.79	55.04	39.00	46.33
24	19.03	47.99	13.56	56.55	03.70	60.84	51.58	60.21	42.57	54.84	38.94	46.00
25	18.92	48.30	13.29	56.73	03.33	60.88	51.27	60.14	42.32	54.64	38.89	45.65
26	18.81	48.59	13.05	56.92	02.99	60.92	50.93	60.06	42.06	54.41	38.88	45.28
27	18.72	48.85	12.82	57.12	02.66	60.98	50.56	59.99	41.79	54.16	38.91	44.91
28	18.66	49.10	12.58	57.34	02.33	61.05	50.16	59.90	41.53	53.88	38.98	44.56
29	18.61	49.37	12.34	57.57	01.98	61.15	49.75	59.78	41.31	53.58	39.07	44.22
30	18.58	49.66			01.59	61.24	49.34	59.63	41.13	53.27	39.17	43.90
31	18.55	49.97			01.16	61.32	48.94	59.46	40.97	52.95	39.28	43.61
32	18.51	50.29			00.72	61.38			40.84	52.65		

Mean R.A. 07^h 08^m 50^s.159 Mean Dec. +87° 09' 34".94 Sec. δ 20.18 Tan δ +20.16

AT UPPER TRANSIT AT GREENWICH.

51 H Cephei. Mag. 5.26

Day.	JULY.		AUGUST.		SEPTEMBER.		OCTOBER.		NOVEMBER.		DECEMBER.	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ₀₇ ^m ₀₈	[°] ₈₇ ['] ₀₉	^h ₀₇ ^m ₀₈	[°] ₈₇ ['] ₀₉	^h ₀₇ ^m ₀₈	[°] ₈₇ ['] ₀₉	^h ₀₇ ^m ₀₉	[°] ₈₇ ['] ₀₉	^h ₀₇ ^m ₀₉	[°] ₈₇ ['] ₀₉	^h ₀₇ ^m ₀₉	[°] ₈₇ ['] ₀₉
	^s	^s	^s	^s	^s	^s	^s	^s	^s	^s	^s	^s
1	39.28	43.61	44.48	34.10	55.45	26.27	10.00	21.75	26.54	21.40	40.68	25.73
2	39.38	43.33	44.71	33.84	55.84	26.05	10.53	21.63	27.12	21.49	41.08	25.99
3	39.46	43.05	44.93	33.56	56.25	25.81	11.10	21.52	27.68	21.61	41.43	26.26
4	39.52	42.78	45.16	33.28	56.70	25.57	11.69	21.43	28.21	21.74	41.75	26.51
5	39.56	42.51	45.39	32.98	57.17	25.34	12.28	21.36	28.71	21.87	42.07	26.73
6	39.60	42.21	45.64	32.65	57.68	25.11	12.87	21.32	29.17	22.00	42.38	26.92
7	39.64	41.90	45.93	32.33	58.20	24.91	13.45	21.31	29.62	22.11	42.71	27.11
8	39.69	41.57	46.25	32.02	58.73	24.74	13.99	21.31	30.06	22.20	43.07	27.30
9	39.75	41.23	46.61	31.71	59.26	24.60	14.49	21.31	30.51	22.28	43.45	27.49
10	39.83	40.87	46.99	31.41	59.76	24.46	14.97	21.29	30.98	22.34	43.86	27.70
11	39.94	40.50	47.39	31.14	60.23	24.34	15.44	21.25	31.49	22.39	44.27	27.94
12	40.09	40.14	47.80	30.89	60.68	24.22	15.91	21.20	32.02	22.46	44.67	28.20
13	40.28	39.80	48.19	30.66	61.10	24.07	16.42	21.13	32.57	22.57	45.04	28.49
14	40.50	39.48	48.56	30.45	61.53	23.90	16.95	21.06	33.12	22.70	45.38	28.79
15	40.73	39.18	48.89	30.24	61.96	23.71	17.51	20.99	33.66	22.85	45.68	29.10
16	40.95	38.88	49.20	30.00	62.43	23.51	18.09	20.94	34.16	23.03	45.95	29.40
17	41.16	38.60	49.50	29.75	62.93	23.31	18.69	20.92	34.64	23.23	46.20	29.68
18	41.33	38.34	49.81	29.48	63.45	23.13	19.29	20.93	35.10	23.42	46.43	29.95
19	41.48	38.08	50.13	29.20	64.01	22.97	19.88	20.95	35.52	23.60	46.65	30.22
20	41.61	37.79	50.50	28.90	64.57	22.82	20.43	20.99	35.92	23.77	46.87	30.48
21	41.74	37.48	50.91	28.61	65.13	22.70	20.96	21.05	36.31	23.94	47.10	30.74
22	41.88	37.15	51.34	28.33	65.68	22.61	21.46	21.11	36.69	24.10	47.34	30.98
23	42.05	36.79	51.79	28.07	66.21	22.53	21.94	21.17	37.08	24.25	47.60	31.22
24	42.27	36.43	52.25	27.84	66.70	22.46	22.41	21.22	37.49	24.39	47.88	31.47
25	42.52	36.07	52.70	27.63	67.17	22.39	22.88	21.25	37.91	24.53	48.17	31.74
26	42.80	35.74	53.14	27.44	67.64	22.31	23.35	21.25	38.36	24.68	48.46	32.04
27	43.11	35.43	53.56	27.26	68.10	22.22	23.82	21.26	38.83	24.84	48.74	32.36
28	43.41	35.14	53.96	27.07	68.55	22.11	24.32	21.27	39.31	25.02	49.00	32.70
29	43.70	34.87	54.34	26.88	69.01	22.00	24.84	21.28	39.78	25.23	49.22	33.05
30	43.98	34.61	54.71	26.68	69.49	21.87	25.39	21.31	40.25	25.47	49.39	33.40
31	44.24	34.36	55.07	26.48	70.00	21.75	25.96	21.34	40.68	25.73	49.52	33.74
32	44.48	34.10	55.45	26.27			26.54	21.40			49.63	34.05

Catalogue Number 434

Spectrum Ma

AT UPPER TRANSIT AT GREENWICH.

4 B Ursæ Minoris. Mag. 7.01

Day.	JANUARY.		FEBRUARY.		MARCH.		APRIL.		MAY.		JUNE.	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ₀₈ ^m ₃₀ ^s ₈₈ [°] ₅₀	⁺	^h ₀₈ ^m ₃₀ ^s ₈₈ [°] ₅₀	⁺	^h ₀₈ ^m ₃₀ ^s ₈₈ [°] ₅₀	⁺	^h ₀₈ ^m ₂₉ ^s ₈₈ [°] ₅₀	⁺	^h ₀₈ ^m ₂₉ ^s ₈₈ [°] ₅₀	⁺	^h ₀₈ ^m ₂₈ ^s ₈₈ [°] ₅₀	⁺
1	^s ₂₅ ·47	[°] ₁₄ ·67	^s ₃₉ ·32	[°] ₂₄ ·02	^s ₃₃ ·32	[°] ₃₂ ·60	^s ₇₀ ·69	[°] ₃₉ ·18	^s ₄₁ ·06	[°] ₄₀ ·41	^s ₇₄ ·11	[°] ₃₆ ·09
2	^s ₂₆ ·18	[°] ₁₄ ·88	^s ₃₉ ·56	[°] ₂₄ ·36	^s ₃₂ ·95	[°] ₃₂ ·90	^s ₆₉ ·65	[°] ₃₉ ·32	^s ₃₉ ·99	[°] ₄₀ ·32	^s ₇₃ ·53	[°] ₃₅ ·85
3	^s ₂₆ ·95	[°] ₁₅ ·09	^s ₃₉ ·72	[°] ₂₄ ·72	^s ₃₂ ·49	[°] ₃₃ ·22	^s ₆₈ ·58	[°] ₃₉ ·44	^s ₃₈ ·98	[°] ₄₀ ·21	^s ₇₂ ·98	[°] ₃₅ ·62
4	^s ₂₇ ·77	[°] ₁₅ ·31	^s ₃₉ ·78	[°] ₂₅ ·08	^s ₃₁ ·93	[°] ₃₃ ·53	^s ₆₇ ·53	[°] ₃₉ ·53	^s ₃₈ ·04	[°] ₄₀ ·09	^s ₇₂ ·44	[°] ₃₅ ·40
5	^s ₂₈ ·63	[°] ₁₅ ·57	^s ₃₉ ·73	[°] ₂₅ ·45	^s ₃₁ ·28	[°] ₃₃ ·81	^s ₆₆ ·49	[°] ₃₉ ·58	^s ₃₇ ·17	[°] ₃₉ ·98	^s ₇₁ ·88	[°] ₃₅ ·19
6	^s ₂₉ ·48	[°] ₁₅ ·86	^s ₃₉ ·58	[°] ₂₅ ·79	^s ₃₀ ·56	[°] ₃₄ ·06	^s ₆₅ ·52	[°] ₃₉ ·63	^s ₃₆ ·34	[°] ₃₉ ·89	^s ₇₁ ·28	[°] ₃₅ ·00
7	^s ₃₀ ·24	[°] ₁₆ ·17	^s ₃₉ ·39	[°] ₂₆ ·11	^s ₂₉ ·82	[°] ₃₄ ·30	^s ₆₄ ·62	[°] ₃₉ ·70	^s ₃₅ ·53	[°] ₃₉ ·81	^s ₇₀ ·64	[°] ₃₄ ·81
8	^s ₃₀ ·93	[°] ₁₆ ·50	^s ₃₉ ·19	[°] ₂₆ ·41	^s ₂₉ ·09	[°] ₃₄ ·52	^s ₆₃ ·77	[°] ₃₉ ·77	^s ₃₄ ·72	[°] ₃₉ ·75	^s ₆₉ ·95	[°] ₃₄ ·61
9	^s ₃₁ ·52	[°] ₁₆ ·81	^s ₃₉ ·01	[°] ₂₆ ·68	^s ₂₈ ·40	[°] ₃₄ ·73	^s ₆₂ ·94	[°] ₃₉ ·85	^s ₃₃ ·86	[°] ₃₉ ·70	^s ₆₉ ·23	[°] ₃₄ ·39
10	^s ₃₂ ·01	[°] ₁₇ ·13	^s ₃₈ ·86	[°] ₂₆ ·94	^s ₂₇ ·76	[°] ₃₄ ·92	^s ₆₂ ·10	[°] ₃₉ ·93	^s ₃₂ ·96	[°] ₃₉ ·64	^s ₆₈ ·50	[°] ₃₄ ·16
11	^s ₃₂ ·42	[°] ₁₇ ·42	^s ₃₈ ·75	[°] ₂₇ ·20	^s ₂₇ ·17	[°] ₃₅ ·11	^s ₆₁ ·24	[°] ₄₀ ·02	^s ₃₂ ·00	[°] ₃₉ ·57	^s ₆₇ ·77	[°] ₃₃ ·90
12	^s ₃₂ ·80	[°] ₁₇ ·70	^s ₃₈ ·69	[°] ₂₇ ·49	^s ₂₆ ·61	[°] ₃₅ ·32	^s ₆₀ ·32	[°] ₄₀ ·12	^s ₃₁ ·01	[°] ₃₉ ·50	^s ₆₇ ·07	[°] ₃₃ ·63
13	^s ₃₃ ·18	[°] ₁₇ ·96	^s ₃₈ ·64	[°] ₂₇ ·79	^s ₂₆ ·05	[°] ₃₅ ·56	^s ₅₉ ·35	[°] ₄₀ ·22	^s ₂₉ ·98	[°] ₃₉ ·41	^s ₆₆ ·42	[°] ₃₃ ·34
14	^s ₃₃ ·59	[°] ₁₈ ·21	^s ₃₈ ·58	[°] ₂₈ ·10	^s ₂₅ ·47	[°] ₃₅ ·81	^s ₅₈ ·33	[°] ₄₀ ·32	^s ₂₈ ·93	[°] ₃₉ ·30	^s ₆₅ ·83	[°] ₃₃ ·04
15	^s ₃₄ ·05	[°] ₁₈ ·46	^s ₃₈ ·48	[°] ₂₈ ·44	^s ₂₄ ·84	[°] ₃₆ ·07	^s ₅₇ ·24	[°] ₄₀ ·40	^s ₂₇ ·88	[°] ₃₉ ·17	^s ₆₅ ·34	[°] ₃₂ ·74
16	^s ₃₄ ·56	[°] ₁₈ ·72	^s ₃₈ ·33	[°] ₂₈ ·78	^s ₂₄ ·15	[°] ₃₆ ·33	^s ₅₆ ·12	[°] ₄₀ ·46	^s ₂₆ ·86	[°] ₃₉ ·02	^s ₆₄ ·93	[°] ₃₂ ·43
17	^s ₃₅ ·10	[°] ₁₉ ·01	^s ₃₈ ·09	[°] ₂₉ ·13	^s ₂₃ ·39	[°] ₃₆ ·59	^s ₅₄ ·98	[°] ₄₀ ·51	^s ₂₅ ·90	[°] ₃₈ ·84	^s ₆₄ ·60	[°] ₃₂ ·14
18	^s ₃₅ ·64	[°] ₁₉ ·31	^s ₃₇ ·78	[°] ₂₉ ·49	^s ₂₂ ·57	[°] ₃₆ ·83	^s ₅₃ ·84	[°] ₄₀ ·54	^s ₂₅ ·02	[°] ₃₈ ·65	^s ₆₄ ·30	[°] ₃₁ ·86
19	^s ₃₆ ·15	[°] ₁₉ ·62	^s ₃₇ ·41	[°] ₂₉ ·83	^s ₂₁ ·69	[°] ₃₇ ·04	^s ₅₂ ·74	[°] ₄₀ ·54	^s ₂₄ ·21	[°] ₃₈ ·46	^s ₆₄ ·00	[°] ₃₁ ·60
20	^s ₃₆ ·62	[°] ₁₉ ·94	^s ₃₆ ·97	[°] ₃₀ ·15	^s ₂₀ ·75	[°] ₃₇ ·24	^s ₅₁ ·68	[°] ₄₀ ·53	^s ₂₃ ·48	[°] ₃₈ ·29	^s ₆₃ ·65	[°] ₃₁ ·36
21	^s ₃₇ ·03	[°] ₂₀ ·29	^s ₃₆ ·48	[°] ₃₀ ·45	^s ₁₉ ·80	[°] ₃₇ ·43	^s ₅₀ ·69	[°] ₄₀ ·50	^s ₂₂ ·81	[°] ₃₈ ·12	^s ₆₃ ·24	[°] ₃₁ ·13
22	^s ₃₇ ·37	[°] ₂₀ ·64	^s ₃₅ ·97	[°] ₃₀ ·74	^s ₁₈ ·85	[°] ₃₇ ·60	^s ₄₉ ·78	[°] ₄₀ ·46	^s ₂₂ ·15	[°] ₃₇ ·96	^s ₆₂ ·77	[°] ₃₀ ·88
23	^s ₃₇ ·63	[°] ₂₀ ·99	^s ₃₅ ·47	[°] ₃₁ ·01	^s ₁₇ ·93	[°] ₃₇ ·75	^s ₄₈ ·92	[°] ₄₀ ·43	^s ₂₁ ·45	[°] ₃₇ ·83	^s ₆₂ ·25	[°] ₃₀ ·60
24	^s ₃₇ ·82	[°] ₂₁ ·34	^s ₃₅ ·01	[°] ₃₁ ·26	^s ₁₇ ·05	[°] ₃₇ ·89	^s ₄₈ ·10	[°] ₄₀ ·42	^s ₂₀ ·71	[°] ₃₇ ·70	^s ₆₁ ·71	[°] ₃₀ ·30
25	^s ₃₇ ·94	[°] ₂₁ ·67	^s ₃₄ ·59	[°] ₃₁ ·50	^s ₁₆ ·24	[°] ₃₈ ·03	^s ₄₇ ·27	[°] ₄₀ ·43	^s ₁₉ ·90	[°] ₃₇ ·57	^s ₆₁ ·19	[°] ₂₉ ·98
26	^s ₃₈ ·03	[°] ₂₁ ·98	^s ₃₄ ·23	[°] ₃₁ ·75	^s ₁₅ ·50	[°] ₃₈ ·16	^s ₄₆ ·40	[°] ₄₀ ·46	^s ₁₉ ·02	[°] ₃₇ ·44	^s ₆₀ ·74	[°] ₂₉ ·65
27	^s ₃₈ ·10	[°] ₂₂ ·28	^s ₃₃ ·93	[°] ₃₂ ·02	^s ₁₄ ·80	[°] ₃₈ ·31	^s ₄₅ ·45	[°] ₄₀ ·49	^s ₁₈ ·10	[°] ₃₇ ·27	^s ₆₀ ·38	[°] ₂₉ ·30
28	^s ₃₈ ·19	[°] ₂₂ ·57	^s ₃₃ ·64	[°] ₃₂ ·30	^s ₁₄ ·10	[°] ₃₈ ·48	^s ₄₄ ·42	[°] ₄₀ ·51	^s ₁₇ ·18	[°] ₃₇ ·07	^s ₆₀ ·11	[°] ₂₈ ·94
29	^s ₃₈ ·33	[°] ₂₂ ·85	^s ₃₃ ·32	[°] ₃₂ ·60	^s ₁₃ ·37	[°] ₃₈ ·66	^s ₄₃ ·31	[°] ₄₀ ·50	^s ₁₆ ·30	[°] ₃₆ ·84	^s ₅₉ ·91	[°] ₂₈ ·59
30	^s ₃₈ ·77	[°] ₂₃ ·40			^s ₁₂ ·56	[°] ₃₈ ·84	^s ₄₂ ·18	[°] ₄₀ ·46	^s ₁₅ ·49	[°] ₃₆ ·60	^s ₅₉ ·77	[°] ₂₈ ·27
31	^s ₃₉ ·04	[°] ₂₃ ·70			^s ₁₁ ·66	[°] ₃₉ ·01	^s ₄₁ ·06	[°] ₄₀ ·41	^s ₁₄ ·76	[°] ₃₆ ·35	^s ₅₉ ·65	[°] ₂₇ ·97
32	^s ₃₉ ·32	[°] ₂₄ ·02			^s ₁₀ ·69	[°] ₃₉ ·18			^s ₁₄ ·11	[°] ₃₆ ·09		

Mean R.A. 08^h 29^m 16^s·541 Mean Dec. +88° 50' 16"·72 Sec δ 49·31 Tan δ +49·30

AT UPPER TRANSIT AT GREENWICH.

4 B Ursæ Minoris. Mag. 7.01

Day.	JULY.		AUGUST.		SEPTEMBER.		OCTOBER.		NOVEMBER.		DECEMBER.	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ^m ^s [°]	^h ^m ^s [°]	^h ^m ^s [°]	^h ^m ^s [°]	^h ^m ^s [°]	^h ^m ^s [°]	^h ^m ^s [°]	^h ^m ^s [°]	^h ^m ^s [°]	^h ^m ^s [°]	^h ^m ^s [°]	^h ^m ^s [°]
	08 28 88 50	08 29 88 50	08 29 88 50	08 29 88 50	08 29 88 49	08 29 88 49	08 29 88 49	08 30 88 49	08 30 88 49	08 30 88 49	08 30 88 49	08 30 88 49
1	59 ^s .65	27 ^s .97	00 ^s .18	17 ^s .69	16 ^s .09	67 ^s .50	44 ^s .03	59 ^s .58	21 ^s .27	55 ^s .14	58 ^s .25	55 ^s .74
2	59 ^s .52	27 ^s .68	00 ^s .40	17 ^s .38	16 ^s .70	67 ^s .18	45 ^s .12	59 ^s .34	22 ^s .68	55 ^s .08	59 ^s .44	55 ^s .89
3	59 ^s .36	27 ^s .40	00 ^s .58	17 ^s .06	17 ^s .37	66 ^s .85	46 ^s .28	59 ^s .09	24 ^s .09	55 ^s .04	60 ^s .55	56 ^s .05
4	59 ^s .17	27 ^s .12	00 ^s .76	16 ^s .73	18 ^s .11	66 ^s .51	47 ^s .52	58 ^s .87	25 ^s .44	55 ^s .03	61 ^s .57	56 ^s .19
5	58 ^s .93	26 ^s .84	00 ^s .95	16 ^s .38	18 ^s .93	66 ^s .17	48 ^s .79	58 ^s .67	26 ^s .71	55 ^s .03	62 ^s .53	56 ^s .32
6	58 ^s .66	26 ^s .56	01 ^s .16	16 ^s .02	19 ^s .83	65 ^s .84	50 ^s .08	58 ^s .49	27 ^s .91	55 ^s .03	63 ^s .47	56 ^s .44
7	58 ^s .37	26 ^s .26	01 ^s .44	15 ^s .64	20 ^s .80	65 ^s .53	51 ^s .35	58 ^s .33	29 ^s .04	55 ^s .02	64 ^s .44	56 ^s .53
8	58 ^s .08	25 ^s .94	01 ^s .80	15 ^s .26	21 ^s .82	65 ^s .25	52 ^s .58	58 ^s .19	30 ^s .14	55 ^s .00	65 ^s .46	56 ^s .62
9	57 ^s .81	25 ^s .60	02 ^s .25	14 ^s .87	22 ^s .84	64 ^s .99	53 ^s .74	58 ^s .06	31 ^s .25	54 ^s .96	66 ^s .55	56 ^s .71
10	57 ^s .58	25 ^s .24	02 ^s .78	14 ^s .50	23 ^s .83	64 ^s .74	54 ^s .82	57 ^s .93	32 ^s .40	54 ^s .90	67 ^s .71	56 ^s .80
11	57 ^s .42	24 ^s .87	03 ^s .38	14 ^s .14	24 ^s .76	64 ^s .51	55 ^s .87	57 ^s .77	33 ^s .62	54 ^s .84	68 ^s .91	56 ^s .93
12	57 ^s .34	24 ^s .49	04 ^s .01	13 ^s .80	25 ^s .63	64 ^s .27	56 ^s .90	57 ^s .60	34 ^s .91	54 ^s .78	70 ^s .11	57 ^s .09
13	57 ^s .36	24 ^s .12	04 ^s .63	13 ^s .49	26 ^s .43	64 ^s .01	57 ^s .95	57 ^s .40	36 ^s .27	54 ^s .74	71 ^s .27	57 ^s .26
14	57 ^s .46	23 ^s .76	05 ^s .20	13 ^s .20	27 ^s .20	63 ^s .74	59 ^s .07	57 ^s .19	37 ^s .66	54 ^s .74	72 ^s .38	57 ^s .46
15	57 ^s .61	23 ^s .42	05 ^s .71	12 ^s .91	27 ^s .98	63 ^s .45	60 ^s .28	56 ^s .99	39 ^s .05	54 ^s .76	73 ^s .42	57 ^s .67
16	57 ^s .77	23 ^s .09	06 ^s .16	12 ^s .61	28 ^s .81	63 ^s .16	61 ^s .55	56 ^s .79	40 ^s .41	54 ^s .79	74 ^s .38	57 ^s .89
17	57 ^s .91	22 ^s .78	06 ^s .56	12 ^s .28	29 ^s .72	62 ^s .86	62 ^s .87	56 ^s .63	41 ^s .71	54 ^s .85	75 ^s .27	58 ^s .11
18	58 ^s .00	22 ^s .49	06 ^s .96	11 ^s .95	30 ^s .72	62 ^s .55	64 ^s .23	56 ^s .48	42 ^s .95	54 ^s .92	76 ^s .11	58 ^s .33
19	58 ^s .03	22 ^s .20	07 ^s .37	11 ^s .60	31 ^s .79	62 ^s .25	65 ^s .58	56 ^s .36	44 ^s .12	54 ^s .99	76 ^s .91	58 ^s .54
20	57 ^s .99	21 ^s .88	07 ^s .86	11 ^s .23	32 ^s .91	61 ^s .98	66 ^s .90	56 ^s .27	45 ^s .24	55 ^s .06	77 ^s .70	58 ^s .73
21	57 ^s .92	21 ^s .54	08 ^s .43	10 ^s .86	34 ^s .06	61 ^s .73	68 ^s .17	56 ^s .19	46 ^s .32	55 ^s .12	78 ^s .50	58 ^s .91
22	57 ^s .86	21 ^s .19	09 ^s .09	10 ^s .48	35 ^s .18	61 ^s .51	69 ^s .37	56 ^s .12	47 ^s .37	55 ^s .17	79 ^s .32	59 ^s .07
23	57 ^s .84	20 ^s .81	09 ^s .82	10 ^s .13	36 ^s .27	61 ^s .30	70 ^s .53	56 ^s .04	48 ^s .42	55 ^s .21	80 ^s .19	59 ^s .24
24	57 ^s .90	20 ^s .43	10 ^s .60	09 ^s .79	37 ^s .33	61 ^s .10	71 ^s .65	55 ^s .96	49 ^s .50	55 ^s .24	81 ^s .11	59 ^s .42
25	58 ^s .06	20 ^s .03	11 ^s .39	09 ^s .48	38 ^s .33	60 ^s .91	72 ^s .74	55 ^s .87	50 ^s .63	55 ^s .27	82 ^s .07	59 ^s .61
26	58 ^s .31	19 ^s .65	12 ^s .16	09 ^s .19	39 ^s .29	60 ^s .72	73 ^s .83	55 ^s .78	51 ^s .81	55 ^s .30	83 ^s .06	59 ^s .82
27	58 ^s .63	19 ^s .28	12 ^s .90	08 ^s .92	40 ^s .21	60 ^s .51	74 ^s .93	55 ^s .67	53 ^s .06	55 ^s .35	84 ^s .05	60 ^s .06
28	58 ^s .97	18 ^s .94	13 ^s .60	08 ^s .65	41 ^s .14	60 ^s .30	76 ^s .07	55 ^s .55	54 ^s .36	55 ^s .41	85 ^s .00	60 ^s .32
29	59 ^s .32	18 ^s .61	14 ^s .26	08 ^s .38	42 ^s .07	60 ^s .07	77 ^s .27	55 ^s .43	55 ^s .67	55 ^s .50	85 ^s .88	60 ^s .60
30	59 ^s .64	18 ^s .30	14 ^s .89	08 ^s .10	43 ^s .02	59 ^s .83	78 ^s .54	55 ^s .32	56 ^s .98	55 ^s .61	86 ^s .66	60 ^s .89
31	59 ^s .93	17 ^s .99	15 ^s .49	07 ^s .81	44 ^s .03	59 ^s .58	79 ^s .88	55 ^s .23	58 ^s .25	55 ^s .74	87 ^s .35	61 ^s .17
32	60 ^s .18	17 ^s .69	16 ^s .09	07 ^s .50			81 ^s .27	55 ^s .14			87 ^s .95	61 ^s .44

AT UPPER TRANSIT AT GREENWICH.

6 B Ursæ Minoris. Mag. 6.28

Day.	JANUARY.		FEBRUARY.		MARCH.		APRIL.		MAY.		JUNE.					
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.				
	^h 12	^m 14	^s 88	[°] 04	^h 12	^m 15	^s 88	[°] 04	^h 12	^m 15	^s 88	[°] 04	^h 12	^m 14	^s 88	[°] 05
1	54 ^s 59	37 ^m 85	14 ^s 44	39 ^m 51	27 ^s 01	45 ^m 69	30 ^s 86	55 ^m 35	23 ^s 01	03 ^m 58	66 ^s 84	08 ^m 12				
2	55 ^s 19	37 ^m 79	15 ^s 08	39 ^m 63	27 ^s 41	45 ^m 94	30 ^s 73	55 ^m 69	22 ^s 50	03 ^m 80	66 ^s 25	08 ^m 14				
3	55 ^s 84	37 ^m 73	15 ^s 74	39 ^m 77	27 ^s 79	46 ^m 21	30 ^s 55	56 ^m 02	21 ^s 99	04 ^m 00	65 ^s 70	08 ^m 15				
4	56 ^s 52	37 ^m 66	16 ^s 39	39 ^m 94	28 ^s 15	46 ^m 50	30 ^s 33	56 ^m 33	21 ^s 49	04 ^m 18	65 ^s 19	08 ^m 17				
5	57 ^s 24	37 ^m 59	17 ^s 02	40 ^m 12	28 ^s 47	46 ^m 82	30 ^s 10	56 ^m 62	21 ^s 03	04 ^m 34	64 ^s 68	08 ^m 20				
6	58 ^s 01	37 ^m 54	17 ^s 60	40 ^m 33	28 ^s 73	47 ^m 14	29 ^s 88	56 ^m 90	20 ^s 61	04 ^m 50	64 ^s 16	08 ^m 25				
7	58 ^s 79	37 ^m 52	18 ^s 12	40 ^m 55	28 ^s 93	47 ^m 47	29 ^s 68	57 ^m 17	20 ^s 22	04 ^m 67	63 ^s 62	08 ^m 32				
8	59 ^s 56	37 ^m 53	18 ^s 58	40 ^m 77	29 ^s 08	47 ^m 79	29 ^s 51	57 ^m 43	19 ^s 84	04 ^m 85	63 ^s 05	08 ^m 38				
9	60 ^s 30	37 ^m 56	18 ^s 99	40 ^m 98	29 ^s 19	48 ^m 09	29 ^s 37	57 ^m 70	19 ^s 45	05 ^m 04	62 ^s 46	08 ^m 45				
10	60 ^s 99	37 ^m 62	19 ^s 39	41 ^m 18	29 ^s 29	48 ^m 37	29 ^s 25	57 ^m 96	19 ^s 06	05 ^m 25	61 ^s 82	08 ^m 51				
11	61 ^s 63	37 ^m 68	19 ^s 80	41 ^m 37	29 ^s 41	48 ^m 64	29 ^s 13	58 ^m 24	18 ^s 64	05 ^m 46	61 ^s 15	08 ^m 56				
12	62 ^s 22	37 ^m 74	20 ^s 24	41 ^m 55	29 ^s 56	48 ^m 90	29 ^s 01	58 ^m 54	18 ^s 18	05 ^m 67	60 ^s 45	08 ^m 58				
13	62 ^s 79	37 ^m 78	20 ^s 70	41 ^m 73	29 ^s 73	49 ^m 16	28 ^s 86	58 ^m 84	17 ^s 68	05 ^m 88	59 ^s 75	08 ^m 58				
14	63 ^s 35	37 ^m 80	21 ^s 19	41 ^m 92	29 ^s 93	49 ^m 43	28 ^s 68	59 ^m 16	17 ^s 14	06 ^m 08	59 ^s 05	08 ^m 56				
15	63 ^s 94	37 ^m 82	21 ^s 70	42 ^m 11	30 ^s 15	49 ^m 71	28 ^s 44	59 ^m 48	16 ^s 56	06 ^m 27	58 ^s 38	08 ^m 52				
16	64 ^s 55	37 ^m 84	22 ^s 23	42 ^m 32	30 ^s 36	50 ^m 02	28 ^s 16	59 ^m 80	15 ^s 96	06 ^m 43	57 ^s 75	08 ^m 46				
17	65 ^s 20	37 ^m 87	22 ^s 75	42 ^m 55	30 ^s 56	50 ^m 34	27 ^s 84	60 ^m 10	15 ^s 35	06 ^m 58	57 ^s 16	08 ^m 40				
18	65 ^s 89	37 ^m 91	23 ^s 26	42 ^m 81	30 ^s 73	50 ^m 67	27 ^s 48	60 ^m 40	14 ^s 75	06 ^m 71	56 ^s 62	08 ^m 33				
19	66 ^s 61	37 ^m 96	23 ^s 74	43 ^m 08	30 ^s 86	51 ^m 02	27 ^s 10	60 ^m 68	14 ^s 18	06 ^m 82	56 ^s 10	08 ^m 28				
20	67 ^s 33	38 ^m 03	24 ^s 17	43 ^m 36	30 ^s 94	51 ^m 38	26 ^s 72	60 ^m 93	13 ^s 65	06 ^m 91	55 ^s 58	08 ^m 24				
21	68 ^s 05	38 ^m 13	24 ^s 55	43 ^m 64	30 ^s 96	51 ^m 73	26 ^s 36	61 ^m 17	13 ^s 16	07 ^m 00	55 ^s 06	08 ^m 21				
22	68 ^s 75	38 ^m 24	24 ^s 90	43 ^m 93	30 ^s 95	52 ^m 07	26 ^s 02	61 ^m 39	12 ^s 70	07 ^m 09	54 ^s 48	08 ^m 20				
23	69 ^s 43	38 ^m 37	25 ^s 20	44 ^m 21	30 ^s 92	52 ^m 40	25 ^s 71	61 ^m 59	12 ^s 25	07 ^m 20	53 ^s 85	08 ^m 18				
24	70 ^s 07	38 ^m 52	25 ^s 47	44 ^m 49	30 ^s 85	52 ^m 71	25 ^s 43	61 ^m 80	11 ^s 79	07 ^m 33	53 ^s 18	08 ^m 16				
25	70 ^s 66	38 ^m 67	25 ^s 73	44 ^m 76	30 ^s 78	53 ^m 00	25 ^s 18	62 ^m 04	11 ^s 30	07 ^m 46	52 ^s 47	08 ^m 12				
26	71 ^s 21	38 ^m 82	26 ^s 00	45 ^m 01	30 ^s 73	53 ^m 28	24 ^s 93	62 ^m 29	10 ^s 75	07 ^m 59	51 ^s 75	08 ^m 05				
27	71 ^s 72	38 ^m 96	26 ^s 31	45 ^m 24	{30 ^s 72 30 ^s 74}	{53 ^m 53 53 ^m 81}	24 ^s 65	62 ^m 55	10 ^s 15	07 ^m 73	51 ^s 05	07 ^m 95				
28	72 ^s 23	39 ^m 08	26 ^s 64	45 ^m 46	30 ^s 79	54 ^m 08	24 ^s 33	62 ^m 81	09 ^s 50	07 ^m 85	50 ^s 38	07 ^m 83				
29	72 ^s 75	39 ^m 20	27 ^s 01	45 ^m 69	30 ^s 85	54 ^m 38	23 ^s 94	63 ^m 08	08 ^s 82	07 ^m 95	49 ^s 76	07 ^m 70				
30	73 ^s 28	39 ^m 31			30 ^s 90	54 ^m 69	23 ^s 50	63 ^m 34	08 ^s 14	08 ^m 03	49 ^s 18	07 ^m 57				
31	73 ^s 84	39 ^m 41			30 ^s 91	55 ^m 02	23 ^s 01	63 ^m 58	07 ^s 48	08 ^m 09	48 ^s 64	07 ^m 44				
32	74 ^s 44	39 ^m 51			30 ^s 86	55 ^m 35		66 ^m 84	08 ^s 12							

Mean R.A. 12^h 14^m 34^s.898 Mean Dec. +88° 04' 56".57 Sec δ 29.88 Tan δ +29.87

AT UPPER TRANSIT AT GREENWICH.

6 B Ursæ Minoris. Mag. 6.28

Day.	JULY.			AUGUST.			SEPTEMBER.			OCTOBER.			NOVEMBER.			DECEMBER.		
	R.A.		Dec.	R.A.		Dec.	R.A.		Dec.	R.A.		Dec.	R.A.		Dec.	R.A.		Dec.
	^h 12	^m 14	^s 88° 05'	^h 12	^m 14	^s 88° 04'	^h 12	^m 14	^s 88° 04'	^h 12	^m 14	^s 88° 04'	^h 12	^m 14	^s 88° 04'	^h 12	^m 14	^s 88° 04'
1	48° 64	07	44	31° 86	61	78	20° 42	52	21	16° 90	40	76	22° 47	28	87	36° 37	19	90
2	48° 13	07	32	31° 42	61° 56	20° 10	51° 87	16° 87	40° 36	22° 87	28° 49	37° 04	19° 68					
3	47° 62	07	21	30° 95	61° 33	19° 78	51° 51	16° 88	39° 93	23° 31	28° 13	37° 67	19° 49					
4	47° 09	07	11	30° 45	61° 10	19° 48	51° 13	16° 94	39° 49	23° 76	27° 79	38° 26	19° 30					
5	46° 54	07	02	29° 93	60° 86	19° 20	50° 75	17° 06	39° 06	24° 21	27° 47	38° 81	19° 13					
6	45° 97	06	93	29° 40	60° 61	18° 97	50° 34	17° 23	38° 64	24° 62	27° 16	39° 33	18° 95					
7	45° 37	06	85	28° 87	60° 33	18° 79	49° 93	17° 41	38° 24	24° 99	26° 87	39° 82	18° 76					
8	44° 73	06	75	28° 35	60° 02	18° 67	49° 51	17° 60	37° 85	25° 32	26° 57	40° 32	18° 56					
9	44° 06	06	62	27° 87	59° 70	18° 59	49° 11	17° 77	37° 48	25° 62	26° 26	40° 85	18° 33					
10	43° 39	06	48	27° 45	59° 37	18° 53	48° 72	17° 90	37° 13	25° 93	25° 93	41° 43	18° 10					
11	42° 72	06	31	27° 08	59° 03	18° 45	48° 36	18° 00	36° 78	26° 25	25° 58	42° 07	17° 87					
12	42° 08	06	13	26° 75	58° 69	18° 35	48° 01	18° 06	36° 42	26° 61	25° 22	42° 75	17° 65					
13	41° 48	05	93	26° 45	58° 38	18° 21	47° 67	18° 10	36° 04	27° 03	24° 86	43° 46	17° 46					
14	40° 92	05	71	26° 16	58° 08	18° 02	47° 32	18° 15	35° 64	27° 50	24° 51	44° 18	17° 30					
15	40° 42	05	49	25° 86	57° 79	17° 80	46° 96	18° 23	35° 22	28° 02	24° 17	44° 91	17° 16					
16	39° 95	05	29	25° 51	57° 51	17° 58	46° 58	18° 37	34° 79	28° 57	23° 86	45° 61	17° 04					
17	39° 49	05	09	25° 12	57° 23	17° 37	46° 19	18° 55	34° 37	29° 12	23° 56	46° 27	16° 93					
18	39° 04	04	91	24° 69	56° 95	17° 21	45° 77	18° 79	33° 95	29° 66	23° 28	46° 91	16° 84					
19	38° 55	04	75	24° 23	56° 65	17° 11	45° 34	19° 07	33° 55	30° 19	23° 02	47° 52	16° 75					
20	38° 02	04	59	23° 78	56° 33	17° 05	44° 91	19° 38	33° 17	30° 69	22° 77	48° 10	16° 65					
21	37° 44	04	43	23° 36	55° 98	17° 04	44° 49	19° 68	32° 80	31° 15	22° 53	48° 66	16° 54					
22	36° 83	04	25	22° 98	55° 61	17° 07	44° 09	19° 98	32° 45	31° 60	22° 29	49° 24	16° 43					
23	36° 19	04	05	22° 65	55° 23	17° 11	43° 70	20° 26	32° 12	32° 04	22° 05	49° 83	16° 30					
24	35° 57	03	82	22° 37	54° 85	17° 15	43° 33	20° 51	31° 79	32° 47	21° 79	50° 45	16° 17					
25	34° 98	03	56	22° 13	54° 48	17° 17	42° 97	20° 72	31° 46	32° 91	21° 52	51° 11	16° 05					
26	34° 44	03	29	21° 92	54° 13	17° 17	42° 61	20° 93	31° 13	33° 38	21° 24	51° 81	15° 92					
27	33° 95	03	01	21° 72	53° 80	17° 15	42° 26	21° 13	30° 79	33° 89	20° 96	52° 56	15° 80					
28	33° 50	02	74	21° 51	53° 49	17° 10	41° 89	21° 33	30° 42	34° 44	20° 67	53° 33	15° 71					
29	33° 08	02	48	21° 27	53° 17	17° 03	41° 52	21° 55	30° 05	35° 05	20° 39	54° 10	15° 66					
30	32° 68	02	24	21° 01	52° 86	16° 95	41° 15	21° 80	29° 66	35° 70	20° 13	54° 85	15° 62					
31	32° 28	02	00	20° 73	52° 54	16° 90	40° 76	22° 11	29° 26	36° 37	19° 90	55° 55	15° 60					
32	31° 86	01	78	20° 42	52° 21			22° 47	28° 87			56° 20	15° 59					

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

57 B Ursæ Minoris. Mag. 7·16

Day.	JANUARY.		FEBRUARY.		MARCH.		APRIL.		MAY.		JUNE.	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 14	^m 59	[°] 87	['] 29	^h 14	^m 59	[°] 87	['] 29	^h 14	^m 59	[°] 87	['] 29
	^s		^s		^s		^s		^s		^s	
1	07·52	32·53	20·96	27·26	34·55	27·85	46·23	33·68	50·29	42·50	45·47	51·69
2	07·82	32·27	21·46	27·14	35·03	27·91	46·54	33·95	50·25	42·84	45·16	51·90
3	08·12	32·00	21·99	27·04	35·54	27·99	46·81	34·25	50·17	43·18	44·87	52·11
4	08·46	31·73	22·54	26·96	36·06	28·10	47·04	34·57	50·07	43·50	44·60	52·31
5	08·83	31·44	23·10	26·90	36·56	28·23	47·22	34·88	49·97	43·80	44·35	52·53
6	09·24	31·16	23·65	26·87	37·02	28·39	47·38	35·17	49·88	44·08	44·10	52·75
7	09·69	30·89	24·18	26·88	37·45	28·58	47·53	35·45	49·81	44·35	43·85	52·98
8	10·16	30·65	24·67	26·89	37·86	28·78	47·67	35·72	{49·75}	{44·62}	43·59	53·22
9	10·63	30·44	25·12	26·90	38·23	28·96	47·83	35·97	49·69	45·15	43·30	53·48
10	11·08	30·25	25·55	26·92	38·58	29·14	48·02	36·22	49·66	45·43	42·99	53·74
11	11·52	30·09	25·97	26·93	38·92	29·30	48·22	36·46	49·63	45·73	42·64	54·00
12	11·92	29·94	26·41	26·93	39·27	29·46	48·43	36·71	49·57	46·05	42·26	54·26
13	12·30	29·79	26·87	26·91	39·65	29·60	48·66	36·98	49·49	46·38	41·86	54·50
14	12·67	29·63	27·35	26·88	40·05	29·74	48·88	37·25	49·38	46·72	41·44	54·71
15	13·05	29·46	27·85	26·86	40·47	29·89	49·09	37·55	49·23	47·06	41·01	54·90
16	13·43	29·27	28·38	26·86	40·90	30·05	49·28	37·88	49·05	47·39	40·59	55·06
17	13·84	29·07	28·92	26·88	41·34	30·23	49·44	38·23	48·85	47·69	40·19	55·21
18	14·29	28·87	29·47	26·91	41·77	30·43	49·56	38·57	48·63	47·98	39·82	55·35
19	14·77	28·68	30·03	26·96	42·19	30·65	49·65	38·91	48·40	48·26	39·47	55·49
20	15·27	28·49	30·57	27·03	42·59	30·89	49·70	39·23	48·19	48·51	39·13	55·64
21	15·79	28·32	31·08	27·12	42·96	31·14	49·73	39·55	48·00	48·74	38·80	55·80
22	16·32	28·18	31·57	27·23	43·29	31·40	49·75	39·85	47·84	48·97	38·46	55·98
23	16·85	28·06	32·03	27·35	43·59	31·67	49·77	40·14	47·69	49·20	38·08	56·19
24	17·36	27·96	32·46	27·47	43·86	31·94	49·81	40·41	47·54	49·46	37·66	56·40
25	17·85	27·88	32·87	27·57	44·11	32·18	49·88	40·67	47·39	49·74	37·20	56·60
26	18·33	27·80	33·28	27·66	44·36	32·40	49·97	40·93	47·23	50·03	36·71	56·79
27	18·79	27·73	33·68	27·74	44·63	32·61	50·06	41·20	47·01	50·34	36·21	56·95
28	19·22	27·67	34·10	27·80	44·91	32·80	50·16	41·50	46·75	50·64	35·70	57·08
29	19·63	27·59	34·55	27·85	45·22	33·00	50·24	41·81	46·45	50·94	35·22	57·19
30	20·05	27·50			45·55	33·21	50·29	42·15	46·13	51·21	34·75	57·30
31	20·49	27·39			45·90	33·44	50·29	42·50	45·80	51·46	34·31	57·39
32	20·96	27·26			46·23	33·68			45·47	51·69		

Mean R.A. 14^h 59^m 14^s·976 Mean Dec. +87° 29' 53"·29 Sec δ 22·91 Tan δ +22·89

AT UPPER TRANSIT AT GREENWICH.

57 B Ursæ Minoris. Mag. 7.16

Day.	JULY.		AUGUST.		SEPTEMBER.		OCTOBER.		NOVEMBER.		DECEMBER.	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ₁₄ ^m ₅₉ ^s ₈₇ [°] ₂₉	+	^h ₁₄ ^m ₅₉ ^s ₈₇ [°] ₂₉	+	^h ₁₄ ^m ₅₈ ^s ₈₇ [°] ₂₉	+	^h ₁₄ ^m ₅₈ ^s ₈₇ [°] ₂₉	+	^h ₁₄ ^m ₅₈ ^s ₈₇ [°] ₂₉	+	^h ₁₄ ^m ₅₈ ^s ₈₇ [°] ₂₉	+
	^s ₃₄ [°] ₃₁ ['] ₅₇ ["] ₃₉		^s ₁₈ [°] ₉₄ ['] ₅₈ ["] ₈₄		^s ₆₂ [°] ₇₂ ['] ₅₅ ["] ₅₄		^s ₄₉ [°] ₂₇ ['] ₄₈ ["] ₁₄		^s ₄₀ [°] ₇₆ ['] ₃₇ ["] ₃₉		^s ₄₀ [°] ₁₀ ['] ₂₆ ["] ₀₄	
1	34.31	57.39	18.94	58.84	62.72	55.54	49.27	48.14	40.76	37.39	40.10	26.04
2	33.90	57.48	18.46	58.82	62.20	55.39	48.84	47.83	40.62	36.97	40.28	25.67
3	33.50	57.58	17.97	58.81	61.65	55.22	48.43	47.51	40.53	36.56	40.46	25.31
4	33.10	57.69	17.45	58.80	61.10	55.04	48.03	47.17	40.46	36.15	40.64	24.97
5	32.69	57.81	16.90	58.79	60.55	54.84	47.67	46.81	40.40	35.76	40.79	24.66
6	32.26	57.93	16.33	58.78	60.01	54.62	47.35	46.44	40.34	35.39	40.91	24.35
7	31.81	58.07	15.74	58.75	59.51	54.36	47.06	46.08	40.26	35.05	41.01	24.05
8	31.34	58.20	15.15	58.69	59.04	54.09	46.79	45.74	40.15	34.71	41.10	23.72
9	30.84	58.33	14.55	58.60	58.59	53.82	46.52	45.41	40.02	34.36	41.19	23.37
10	30.30	58.45	13.98	58.49	58.17	53.57	46.25	45.11	39.87	34.02	41.31	23.01
11	29.75	58.55	13.42	58.36	57.76	53.34	45.96	44.81	39.72	33.65	41.47	22.63
12	29.20	58.63	12.91	58.24	57.35	53.12	45.63	44.51	39.58	33.26	41.67	22.25
13	28.66	58.68	12.42	58.12	56.93	52.91	45.27	44.21	39.47	32.86	41.91	21.87
14	28.13	58.70	11.95	58.01	56.47	52.70	44.91	43.89	39.42	32.44	42.17	21.51
15	27.62	58.71	11.48	57.90	55.98	52.49	44.55	43.54	39.39	32.03	42.46	21.18
16	27.15	58.72	11.00	57.80	55.47	52.28	44.21	43.17	39.40	31.61	42.76	20.86
17	26.69	58.73	10.48	57.72	54.95	52.04	43.90	42.79	39.43	31.20	43.05	20.56
18	26.25	58.76	09.94	57.64	54.44	51.78	43.63	42.40	39.48	30.81	43.33	20.27
19	25.81	58.80	09.37	57.56	53.95	51.50	43.40	42.01	39.54	30.44	43.60	20.00
20	25.34	58.85	08.78	57.46	53.50	51.20	43.20	41.62	39.60	30.09	43.84	19.73
21	24.83	58.93	08.18	57.34	53.08	50.88	43.02	41.25	39.63	29.76	44.07	19.47
22	24.28	59.00	07.60	57.19	52.70	50.56	42.84	40.89	39.65	29.42	44.30	19.20
23	23.71	59.05	07.03	57.02	52.33	50.27	42.66	40.56	39.66	29.08	44.53	18.91
24	23.12	59.09	06.50	56.84	51.97	49.98	42.48	40.23	39.66	28.74	44.78	18.61
25	22.52	59.11	06.00	56.65	51.62	49.71	42.29	39.91	39.65	28.40	45.04	18.29
26	21.94	59.10	05.54	56.46	51.27	49.44	42.08	39.59	39.65	28.03	45.34	17.97
27	21.39	59.05	05.09	56.28	50.90	49.18	41.85	39.27	39.67	27.64	45.68	17.66
28	20.86	58.99	04.63	56.11	50.52	48.93	41.60	38.93	39.73	27.24	46.06	17.34
29	20.36	58.94	04.18	55.95	50.13	48.68	41.36	38.57	39.82	26.83	46.46	17.04
30	19.88	58.90	03.71	55.81	49.70	48.42	41.14	38.19	39.94	26.43	46.86	16.77
31	19.41	58.87	03.23	55.67	49.27	48.14	40.94	37.80	40.10	26.04	47.25	16.52
32	18.94	58.84	02.72	55.54			40.76	37.39			47.63	16.29

AT UPPER TRANSIT AT GREENWICH.

ε Ursæ Minoris. Mag. 4.40

Day.	JANUARY.		FEBRUARY.		MARCH.		APRIL.		MAY.		JUNE.	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ₁₆ ^m ₅₂	[°] ₈₂ ['] ₀₈	^h ₁₆ ^m ₅₂	[°] ₈₂ ['] ₀₈	^h ₁₆ ^m ₅₂	[°] ₈₂ ['] ₀₈	^h ₁₆ ^m ₅₃	[°] ₈₂ ['] ₀₈	^h ₁₆ ^m ₅₃	[°] ₈₂ ['] ₀₈	^h ₁₆ ^m ₅₃	[°] ₈₂ ['] ₀₉
1	51 ^s .06	56 ["] .65	53 ^s .94	47 ["] .61	58 ^s .10	43 ["] .76	02 ^s .90	45 ["] .28	06 ^s .23	51 ["] .97	07 ^s .25	01 ["] .65
2	51 ^s .09	56 ["] .32	54 ^s .06	47 ["] .34	58 ^s .26	43 ["] .67	03 ^s .06	45 ["] .43	06 ^s .30	52 ["] .30	07 ^s .22	01 ["] .98
3	51 ^s .12	55 ["] .99	54 ^s .19	47 ["] .08	58 ^s .43	43 ["] .58	03 ^s .21	45 ["] .61	06 ^s .36	52 ["] .63	07 ^s .19	02 ["] .29
4	51 ^s .17	55 ["] .64	54 ^s .34	46 ["] .84	58 ^s .60	43 ["] .51	03 ^s .34	45 ["] .82	06 ^s .42	52 ["] .94	07 ^s .17	02 ["] .57
5	51 ^s .23	55 ["] .27	54 ^s .48	46 ["] .61	58 ^s .78	43 ["] .47	03 ^s .47	46 ["] .04	06 ^s .47	53 ["] .25	{07 ^s .15}	{02 ["] .84}
6	51 ^s .30	54 ["] .89	54 ^s .64	46 ["] .41	58 ^s .95	43 ["] .46	03 ^s .59	46 ["] .26	06 ^s .51	53 ["] .55	{07 ^s .14}	{03 ["] .12}
7	51 ^s .37	54 ["] .50	54 ^s .79	46 ["] .23	59 ^s .12	43 ["] .48	03 ^s .71	46 ["] .46	06 ^s .56	53 ["] .82	07 ^s .10	03 ["] .70
8	51 ^s .45	54 ["] .11	54 ^s .93	46 ["] .08	59 ^s .28	43 ["] .52	03 ^s .81	46 ["] .65	06 ^s .62	54 ["] .07	07 ^s .09	04 ["] .01
9	51 ^s .54	53 ["] .76	55 ^s .08	45 ["] .96	59 ^s .43	43 ["] .57	03 ^s .93	46 ["] .83	06 ^s .68	54 ["] .33	07 ^s .07	04 ["] .33
10	51 ^s .63	53 ["] .45	55 ^s .21	45 ["] .83	59 ^s .58	43 ["] .62	04 ^s .04	46 ["] .99	06 ^s .74	54 ["] .59	07 ^s .04	04 ["] .66
11	51 ^s .72	53 ["] .17	55 ^s .35	45 ["] .69	59 ^s .72	43 ["] .65	04 ^s .17	47 ["] .15	06 ^s .80	54 ["] .87	07 ^s .01	05 ["] .01
12	51 ^s .80	52 ["] .91	55 ^s .48	45 ["] .54	59 ^s .87	43 ["] .68	04 ^s .29	47 ["] .32	06 ^s .87	55 ["] .16	06 ^s .97	05 ["] .36
13	51 ^s .89	52 ["] .64	55 ^s .61	45 ["] .37	60 ^s .02	43 ["] .69	04 ^s .42	47 ["] .50	06 ^s .93	55 ["] .47	06 ^s .91	05 ["] .71
14	51 ^s .97	52 ["] .37	55 ^s .75	45 ["] .20	60 ^s .17	43 ["] .69	04 ^s .54	47 ["] .68	06 ^s .98	55 ["] .79	06 ^s .85	06 ["] .04
15	52 ^s .05	52 ["] .10	55 ^s .90	45 ["] .02	60 ^s .32	43 ["] .71	04 ^s .68	47 ["] .89	07 ^s .03	56 ["] .13	06 ^s .79	06 ["] .35
16	52 ^s .12	51 ["] .82	56 ^s .06	44 ["] .85	60 ^s .49	43 ["] .73	04 ^s .81	48 ["] .11	07 ^s .07	56 ["] .48	06 ^s .72	06 ["] .64
17	52 ^s .21	51 ["] .52	56 ^s .22	44 ["] .70	60 ^s .66	43 ["] .76	04 ^s .93	48 ["] .36	07 ^s .10	56 ["] .84	06 ^s .66	06 ["] .91
18	52 ^s .31	51 ["] .20	56 ^s .39	44 ["] .55	60 ^s .83	43 ["] .80	05 ^s .05	48 ["] .64	07 ^s .12	57 ["] .19	06 ^s .60	07 ["] .16
19	52 ^s .41	50 ["] .87	56 ^s .55	44 ["] .42	61 ^s .00	43 ["] .86	05 ^s .15	48 ["] .92	07 ^s .14	57 ["] .52	06 ^s .54	07 ["] .41
20	52 ^s .51	50 ["] .55	56 ^s .73	44 ["] .31	61 ^s .16	43 ["] .95	05 ^s .25	49 ["] .19	07 ^s .15	57 ["] .84	06 ^s .49	07 ["] .67
21	52 ^s .62	50 ["] .23	56 ^s .89	44 ["] .22	61 ^s .32	44 ["] .06	05 ^s .34	49 ["] .47	07 ^s .16	58 ["] .15	06 ^s .45	07 ["] .95
22	52 ^s .74	49 ["] .92	57 ^s .06	44 ["] .15	61 ^s .49	44 ["] .19	05 ^s .43	49 ["] .74	07 ^s .17	58 ["] .43	06 ^s .40	08 ["] .23
23	52 ^s .87	49 ["] .64	57 ^s .22	44 ["] .11	61 ^s .64	44 ["] .32	05 ^s .51	50 ["] .00	07 ^s .19	58 ["] .70	06 ^s .34	08 ["] .53
24	53 ^s .00	49 ["] .39	57 ^s .37	44 ["] .08	61 ^s .78	44 ["] .46	05 ^s .59	50 ["] .24	07 ^s .21	58 ["] .97	06 ^s .27	08 ["] .87
25	53 ^s .12	49 ["] .16	57 ^s .52	44 ["] .04	61 ^s .92	44 ["] .58	05 ^s .67	50 ["] .45	07 ^s .23	59 ["] .25	06 ^s .19	09 ["] .21
26	53 ^s .25	48 ["] .94	57 ^s .67	43 ["] .99	62 ^s .05	44 ["] .70	05 ^s .76	50 ["] .66	07 ^s .26	59 ["] .55	06 ^s .11	09 ["] .53
27	53 ^s .37	48 ["] .74	57 ^s .81	43 ["] .93	62 ^s .18	44 ["] .80	05 ^s .86	50 ["] .88	07 ^s .28	59 ["] .88	06 ^s .01	09 ["] .84
28	53 ^s .48	48 ["] .53	57 ^s .95	43 ["] .85	62 ^s .32	44 ["] .89	05 ^s .96	51 ["] .12	07 ^s .29	60 ["] .22	05 ^s .90	10 ["] .13
29	53 ^s .59	48 ["] .33	58 ^s .10	43 ["] .76	62 ^s .46	44 ["] .97	06 ^s .06	51 ["] .38	07 ^s .29	60 ["] .58	05 ^s .81	10 ["] .39
30	53 ^s .70	48 ["] .11			62 ^s .60	45 ["] .06	06 ^s .15	51 ["] .66	07 ^s .29	60 ["] .95	05 ^s .71	10 ["] .63
31	53 ^s .82	47 ["] .87			62 ^s .75	45 ["] .16	06 ^s .23	51 ["] .97	07 ^s .28	61 ["] .31	05 ^s .62	10 ["] .86
32	53 ^s .94	47 ["] .61			62 ^s .90	45 ["] .28			07 ^s .25	61 ["] .65		

Mean R.A. 16^h 52^m 58^s.218 Mean Dec. +82° 09' 12".77 Sec δ 7.32 Tan δ +7.26

AT UPPER TRANSIT AT GREENWICH.

ε Ursæ Minoris. Mag. 4.40

Day.	JULY.		AUGUST.		SEPTEMBER.		OCTOBER.		NOVEMBER.		DECEMBER.	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ₁₀ ^m ₅₃	[°] ₈₂ ['] ₀₉	^h ₁₆ ^m ₅₂	[°] ₈₂ ['] ₀₉	^h ₁₆ ^m ₅₂	[°] ₈₂ ['] ₀₉	^h ₁₆ ^m ₅₂	[°] ₈₂ ['] ₀₉	^h ₁₆ ^m ₅₂	[°] ₈₂ ['] ₀₉	^h ₁₆ ^m ₅₂	[°] ₈₂ ['] ₀₈
	^s ₀₅	["] ₈₆	^s ₆₁	["] ₈₄	^s ₅₆	["] ₆₇	^s ₅₁	["] ₃₀	^s ₄₆	["] ₆₁	^s ₄₄	["] ₀₅
1	05.62	10.86	61.84	17.32	56.67	19.74	51.30	17.55	46.61	10.72	44.05	60.80
2	05.54	11.09	61.71	17.46	56.49	19.77	51.12	17.41	46.49	10.38	44.03	60.39
3	05.45	11.32	61.57	17.61	56.30	19.80	50.94	17.26	46.37	10.05	44.01	60.02
4	05.37	11.55	61.41	17.78	56.11	19.82	50.76	17.09	46.26	09.72	43.98	59.67
5	05.28	11.79	61.26	17.96	55.92	19.82	50.58	16.89	46.16	09.40	43.95	59.34
6	05.20	12.04	61.10	18.13	55.72	19.79	50.41	16.67	46.07	09.10	43.92	59.04
7	05.10	12.31	60.94	18.29	55.53	19.73	50.25	16.44	45.97	08.81	43.88	58.73
8	05.01	12.59	60.77	18.44	55.35	19.66	50.10	16.22	45.86	08.53	43.85	58.40
9	04.90	12.88	60.59	18.56	55.17	19.57	49.96	16.01	45.75	08.28	43.81	58.06
10	04.78	13.16	60.42	18.66	54.99	19.48	49.81	15.83	45.64	08.02	43.78	57.71
11	04.66	13.43	60.24	18.74	54.82	19.41	49.65	15.66	45.52	07.75	43.76	57.34
12	04.53	13.68	60.08	18.79	54.65	19.35	49.49	15.51	45.40	07.44	43.74	56.93
13	04.39	13.91	59.91	18.84	54.48	19.30	49.32	15.35	45.29	07.11	43.73	56.50
14	04.26	14.12	59.76	18.88	54.31	19.27	49.16	15.18	45.19	06.75	43.73	56.09
15	04.14	14.30	59.60	18.95	54.13	19.25	48.99	14.99	45.10	06.38	43.74	55.69
16	04.02	14.47	59.45	19.03	53.94	19.23	48.83	14.79	45.02	06.00	43.76	55.30
17	03.90	14.63	59.29	19.13	53.74	19.18	48.66	14.56	44.94	05.63	43.77	54.93
18	03.79	14.81	59.12	19.24	53.54	19.11	48.50	14.30	44.87	05.28	43.79	54.59
19	03.68	14.99	58.94	19.36	53.35	19.02	48.35	14.02	44.81	04.93	43.81	54.26
20	03.56	15.19	58.76	19.46	53.16	18.90	48.22	13.74	44.74	04.60	43.82	53.94
21	03.44	15.41	58.57	19.54	52.99	18.76	48.08	13.46	44.68	04.29	43.84	53.62
22	03.30	15.66	58.38	19.60	52.81	18.61	47.95	13.19	44.62	03.99	43.85	53.30
23	03.16	15.90	58.19	19.64	52.64	18.46	47.83	12.95	44.55	03.69	43.86	52.97
24	03.01	16.13	58.01	19.66	52.48	18.33	47.70	12.71	44.48	03.38	43.88	52.62
25	02.85	16.34	57.83	19.66	52.32	18.20	47.57	12.49	44.41	03.07	43.89	52.26
26	02.70	16.52	57.67	19.65	52.16	18.07	47.43	12.27	44.34	02.73	43.91	51.87
27	02.55	16.69	57.50	19.64	52.00	17.96	47.30	12.04	44.26	02.38	43.95	51.47
28	02.39	16.83	57.33	19.64	51.83	17.86	47.17	11.81	44.19	02.01	44.00	51.07
29	02.25	16.95	57.17	19.65	51.65	17.76	47.03	11.58	44.13	01.62	44.05	50.68
30	02.11	17.07	57.01	19.67	51.48	17.66	46.88	11.32	44.09	01.21	44.10	50.31
31	01.97	17.19	56.84	19.70	51.30	17.55	46.74	11.03	44.05	00.80	44.17	49.96
32	01.84	17.32	56.67	19.74			46.61	10.72			44.23	49.63

AT UPPER TRANSIT AT GREENWICH.

 δ Ursæ Minoris. Mag. 4.44

Day.	JANUARY.		FEBRUARY.		MARCH.		APRIL.		MAY.		JUNE.	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ₁₇ ^m ₅₄	^s ₈₆ [°] ₃₆	^h ₁₇ ^m ₅₄	^s ₈₆ [°] ₃₆	^h ₁₇ ^m ₅₄	^s ₈₆ [°] ₃₆	^h ₁₇ ^m ₅₄	^s ₈₆ [°] ₃₆	^h ₁₇ ^m ₅₄	^s ₈₆ [°] ₃₆	^h ₁₇ ^m ₅₄	^s ₈₆ [°] ₃₆
1	07 ^s .92	36 ["] .08	11 ^s .34	26 ["] .25	19 ^s .25	20 ["] .57	30 ^s .16	19 ["] .63	39 ^s .22	24 ["] .31	43 ^s .83	33 ["] .09
2	07.90	35.76	11.52	25.94	19.57	20.40	30.54	19.69	39.46	24.59	43.84	33.41
3	07.87	35.43	11.73	25.62	19.91	20.23	30.92	19.78	39.68	24.88	43.85	33.71
4	07.84	35.09	11.97	25.31	20.27	20.08	31.28	19.90	39.88	25.16	43.86	34.00
5	07.83	34.72	12.24	25.01	20.65	19.96	31.62	20.05	40.06	25.43	43.88	34.28
6	07.85	34.33	12.51	24.74	21.03	19.87	31.93	20.20	40.23	25.69	43.91	34.55
7	07.90	33.94	12.80	24.50	21.41	19.80	32.23	20.34	40.40	25.93	43.95	34.83
8	07.96	33.55	13.08	24.30	21.77	19.76	32.52	20.47	40.59	26.16	43.99	35.12
9	08.05	33.19	13.34	24.12	22.12	19.73	32.81	20.59	40.78	26.38	44.04	35.42
10	08.16	32.85	13.59	23.93	22.45	19.71	33.10	20.70	40.98	26.60	44.08	35.74
11	08.28	32.54	13.84	23.74	22.77	19.67	33.40	20.79	41.19	26.82	44.11	36.08
12	08.38	32.23	14.08	23.53	23.09	19.62	33.72	20.88	41.40	27.05	44.12	36.43
13	08.47	31.95	14.32	23.31	23.40	19.56	34.06	20.98	41.62	27.31	44.11	36.79
14	08.55	31.67	14.57	23.09	23.73	19.50	34.40	21.09	41.83	27.59	44.09	37.16
15	08.62	31.37	14.84	22.86	24.08	19.42	34.75	21.22	42.03	27.88	44.04	37.52
16	08.70	31.06	15.12	22.62	24.44	19.35	35.09	21.37	42.21	28.20	43.96	37.86
17	08.78	30.74	15.42	22.39	24.81	19.28	35.43	21.54	42.37	28.52	43.87	38.18
18	08.87	30.40	15.75	22.16	25.21	19.22	35.76	21.74	42.51	28.84	43.78	38.48
19	08.99	30.05	16.09	21.95	25.61	19.20	36.07	21.95	42.62	29.17	43.68	38.75
20	09.13	29.68	16.44	21.76	26.00	19.20	36.36	22.17	42.72	29.47	43.61	39.02
21	09.28	29.33	16.79	21.60	26.39	19.22	36.63	22.39	42.80	29.75	{43.55}	{39.28}
											{43.52}	{39.56}
22	09.46	28.99	17.13	21.46	26.77	19.26	36.88	22.60	42.88	30.01	43.48	39.87
23	09.66	28.68	17.46	21.34	27.14	19.31	37.11	22.79	42.97	30.27	43.43	40.20
24	09.87	28.38	17.78	21.23	27.50	19.38	37.35	22.97	43.08	30.52	43.36	40.55
25	10.08	28.09	18.09	21.12	27.83	19.45	37.58	23.14	43.20	30.78	43.27	40.92
26	10.28	27.82	18.39	21.01	28.14	19.49	37.83	23.30	43.34	31.06	43.15	41.28
27	10.48	27.56	18.68	20.88	28.45	19.52	38.10	23.46	43.47	31.36	43.01	41.63
28	10.67	27.32	18.96	20.73	28.76	19.54	38.38	23.63	43.60	31.68	42.85	41.96
29	10.85	27.08	19.25	20.57	29.09	19.56	38.67	23.84	43.70	32.03	42.68	42.27
30	11.01	26.82			29.42	19.57	38.95	24.06	43.77	32.39	42.51	42.55
31	11.17	26.55			29.78	19.59	39.22	24.31	43.81	32.74	42.35	42.82
32	11.34	26.25			30.16	19.63			43.83	33.09		

Mean R.A. 17^h 54^m 28^s.218 Mean Dec. + 86° 36' 47".92 Sec δ 16.93 Tan δ +16.90

AT UPPER TRANSIT AT GREENWICH.

δ Ursæ Minoris. Mag. 4.44

Day.	JULY.		AUGUST.		SEPTEMBER.		OCTOBER.		NOVEMBER.		DECEMBER.	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ^m ^s 17 54 86 36	+	^h ^m ^s 17 54 86 36	+	^h ^m ^s 17 54 86 36	+	^h ^m ^s 17 53 86 36	+	^h ^m ^s 17 53 86 36	+	^h ^m ^s 17 53 86 36	+
1	42°35	42°82	35°30	51°07	24°08	56°20	71°20	57°06	58°41	53°21	49°48	45°37
2	42°20	43°09	35°03	51°28	23°69	56°33	70°73	57°03	58°02	52°97	49°29	45°01
3	42°06	43°35	34°75	51°51	23°27	56°46	70°26	56°98	57°65	52°72	49°13	44°67
4	41°93	43°61	34°47	51°75	22°83	56°59	69°79	56°91	57°30	52°46	48°98	44°36
5	41°81	43°89	34°17	52°00	22°39	56°70	69°33	56°81	56°98	52°21	48°83	44°07
6	41°68	44°18	33°85	52°25	21°93	56°78	68°88	56°70	56°67	51°98	48°65	43°81
7	41°55	44°49	33°51	52°50	21°46	56°84	68°45	56°57	56°37	51°76	48°46	43°54
8	41°40	44°81	33°16	52°74	21°00	56°86	68°03	56°44	56°05	51°56	48°27	43°26
9	41°23	45°14	32°78	52°95	20°57	56°87	67°63	56°34	55°72	51°38	48°07	42°97
10	41°04	45°48	32°39	53°13	20°14	56°88	67°25	56°26	55°38	51°20	47°86	42°65
11	40°82	45°81	32°00	53°30	19°73	56°89	66°86	56°19	55°02	51°01	47°67	42°31
12	40°59	46°12	31°63	53°45	19°34	56°93	66°46	56°11	54°66	50°79	47°49	41°95
13	40°34	46°41	31°26	53°58	18°95	56°98	66°04	56°05	54°30	50°54	47°35	41°57
14	40°07	46°68	30°91	53°70	18°55	57°03	65°60	55°99	53°95	50°27	47°23	41°19
15	39°81	46°92	30°58	53°84	18°13	57°11	65°14	55°91	53°62	49°97	47°13	40°82
16	39°57	47°15	30°25	54°00	17°69	57°19	64°68	55°80	53°31	49°68	47°04	40°46
17	39°34	47°38	29°92	54°18	17°23	57°26	64°23	55°66	53°02	49°38	46°97	40°11
18	39°12	47°60	29°57	54°38	16°76	57°30	63°79	55°51	52°76	49°07	46°91	39°78
19	38°92	47°85	29°20	54°59	16°28	57°32	63°37	55°34	52°52	48°78	46°85	39°47
20	38°71	48°12	28°81	54°79	15°81	57°32	62°97	55°16	52°28	48°51	46°78	39°16
21	38°50	48°41	28°40	54°98	15°35	57°29	62°58	54°97	52°04	48°26	46°71	38°86
22	38°26	48°72	27°98	55°15	14°91	57°25	62°21	54°80	51°80	48°01	46°63	38°56
23	38°00	49°03	27°55	55°30	14°48	57°20	61°85	54°64	51°56	47°77	46°54	38°25
24	37°71	49°33	27°12	55°42	14°06	57°15	61°50	54°48	51°30	47°52	46°45	37°92
25	37°40	49°60	26°71	55°51	13°67	57°12	61°15	54°33	51°03	47°27	46°36	37°57
26	37°08	49°86	26°31	55°59	13°27	57°09	60°79	54°19	50°75	47°00	46°27	37°20
27	36°75	50°09	25°93	55°67	12°88	57°07	60°42	54°06	50°48	46°72	46°21	36°81
28	36°44	50°30	25°56	55°76	12°48	57°07	60°04	53°92	50°20	46°41	46°18	36°42
29	36°14	50°50	25°19	55°85	12°07	57°07	59°64	53°78	49°94	46°08	46°17	36°03
30	35°86	50°69	24°83	55°96	11°64	57°07	59°22	53°62	49°70	45°73	46°19	35°65
31	35°58	50°88	24°46	56°07	11°20	57°06	58°81	53°43	49°48	45°37	46°22	35°30
32	35°30	51°07	24°08	56°20			58°41	53°21			46°26	34°97

AT UPPER TRANSIT AT GREENWICH.

 λ Ursæ Minoris. Mag. 6.55

Day.	JANUARY.		FEBRUARY.		MARCH.		APRIL.		MAY.		JUNE.	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ₁₈ ^m ₄₄	[°] ₈₉ ['] ₀₁	^h ₁₈ ^m ₄₄	[°] ₈₉ ['] ₀₁	^h ₁₈ ^m ₄₄	[°] ₈₉ ['] ₀₁	^h ₁₈ ^m ₄₅	[°] ₈₉ ['] ₀₁	^h ₁₈ ^m ₄₅	[°] ₈₉ ['] ₀₁	^h ₁₈ ^m ₄₆	[°] ₈₉ ['] ₀₁
1	^s ₁₁ ["] ₅₅	₆₀ ["] ₃₃	^s ₁₄ ["] ₁₂	₅₀ ["] ₂₉	^s ₃₅ ["] ₈₁	₄₃ ["] ₃₁	^s ₁₁ ["] ₆₃	₄₀ ["] ₃₆	^s ₄₅ ["] ₉₄	₄₃ ["] ₁₄	^s ₀₈ ["] ₃₆	₅₀ ["] ₇₃
2	₁₁ ["] ₁₇	₆₀ ["] ₀₃	₁₄ ["] ₄₅	₄₉ ["] ₉₅	₃₆ ["] ₇₁	₄₃ ["] ₀₈	₁₂ ["] ₉₉	₄₀ ["] ₃₅	₄₇ ["] ₀₀	₄₃ ["] ₃₆	₀₈ ["] ₆₂	₅₁ ["] ₀₄
3	₁₀ ["] ₇₅	₅₉ ["] ₇₁	₁₄ ["] ₈₇	₄₉ ["] ₆₁	₃₇ ["] ₇₁	₄₂ ["] ₈₅	₁₄ ["] ₃₆	₄₀ ["] ₃₇	₄₇ ["] ₉₇	₄₃ ["] ₆₀	₀₈ ["] ₈₆	₅₁ ["] ₃₄
4	₁₀ ["] ₃₂	₅₉ ["] ₃₈	₁₅ ["] ₄₀	₄₉ ["] ₂₇	₃₈ ["] ₈₀	₄₂ ["] ₆₄	₁₅ ["] ₆₉	₄₀ ["] ₄₁	₄₈ ["] ₈₅	₄₃ ["] ₈₄	₀₉ ["] ₀₉	₅₁ ["] ₆₃
5	₀₉ ["] ₉₂	₅₉ ["] ₀₄	₁₆ ["] ₀₅	₄₈ ["] ₉₃	₃₉ ["] ₉₉	₄₂ ["] ₄₆	₁₆ ["] ₉₅	₄₀ ["] ₄₉	₄₉ ["] ₆₅	₄₄ ["] ₀₇	₀₉ ["] ₃₄	₅₁ ["] ₈₉
6	₀₉ ["] ₅₉	₅₈ ["] ₆₇	₁₆ ["] ₇₉	₄₈ ["] ₆₃	₄₁ ["] ₂₂	₄₂ ["] ₃₁	₁₈ ["] ₁₄	₄₀ ["] ₅₇	₅₀ ["] ₄₁	₄₄ ["] ₂₈	₀₉ ["] ₆₄	₅₂ ["] ₁₅
7	₀₉ ["] ₃₈	₅₈ ["] ₂₈	₁₇ ["] ₅₆	₄₈ ["] ₃₅	₄₂ ["] ₄₆	₄₂ ["] ₁₈	₁₉ ["] ₂₅	₄₀ ["] ₆₅	₅₁ ["] ₁₅	₄₄ ["] ₄₇	₀₉ ["] ₉₉	₅₂ ["] ₄₂
8	₀₉ ["] ₂₉	₅₇ ["] ₈₉	₁₈ ["] ₃₄	₄₈ ["] ₁₀	₄₃ ["] ₆₅	₄₂ ["] ₀₇	₂₀ ["] ₃₁	₄₀ ["] ₇₂	₅₁ ["] ₉₁	₄₄ ["] ₆₅	₁₀ ["] ₃₈	₅₂ ["] ₆₉
9	₀₉ ["] ₃₀	₅₇ ["] ₅₁	₁₉ ["] ₀₇	₄₇ ["] ₈₆	₄₄ ["] ₇₉	₄₁ ["] ₉₈	₂₁ ["] ₃₅	₄₀ ["] ₇₇	₅₂ ["] ₇₂	₄₄ ["] ₈₂	₁₀ ["] ₇₉	₅₂ ["] ₉₈
10	₀₉ ["] ₃₈	₅₇ ["] ₁₇	₁₉ ["] ₇₆	₄₇ ["] ₆₄	₄₅ ["] ₈₇	₄₁ ["] ₈₉	₂₂ ["] ₄₀	₄₀ ["] ₈₂	₅₃ ["] ₅₇	₄₄ ["] ₉₉	₁₁ ["] ₂₀	₅₃ ["] ₂₇
11	₀₉ ["] ₅₀	₅₆ ["] ₈₅	₂₀ ["] ₄₀	₄₇ ["] ₄₁	₄₆ ["] ₈₉	₄₁ ["] ₈₀	₂₃ ["] ₄₈	₄₀ ["] ₈₄	₅₄ ["] ₄₇	₄₅ ["] ₁₇	₁₁ ["] ₅₈	₅₃ ["] ₅₈
12	₀₉ ["] ₅₉	₅₆ ["] ₅₆	₂₁ ["] ₀₁	₄₇ ["] ₁₇	₄₇ ["] ₈₉	₄₁ ["] ₇₀	₂₄ ["] ₆₂	₄₀ ["] ₈₇	₅₅ ["] ₄₁	₄₅ ["] ₃₆	₁₁ ["] ₉₂	₅₃ ["] ₉₁
13	₀₉ ["] ₆₅	₅₆ ["] ₂₇	₂₁ ["] ₆₁	₄₆ ["] ₉₂	₄₈ ["] ₉₀	₄₁ ["] ₅₉	₂₅ ["] ₈₁	₄₀ ["] ₉₁	₅₆ ["] ₃₇	₄₅ ["] ₅₆	₁₂ ["] ₁₈	₅₄ ["] ₂₆
14	₀₉ ["] ₆₅	₅₅ ["] ₉₈	₂₂ ["] ₂₂	₄₆ ["] ₆₅	₄₉ ["] ₉₄	₄₁ ["] ₄₆	₂₇ ["] ₀₅	₄₀ ["] ₉₅	₅₇ ["] ₃₂	₄₅ ["] ₇₉	₁₂ ["] ₃₅	₅₄ ["] ₆₁
15	₀₉ ["] ₆₁	₅₅ ["] ₆₈	₂₂ ["] ₉₀	₄₆ ["] ₃₆	₅₁ ["] ₀₃	₄₁ ["] ₃₁	₂₈ ["] ₃₅	₄₁ ["] ₀₂	₅₈ ["] ₂₄	₄₆ ["] ₀₄	₁₂ ["] ₄₃	₅₄ ["] ₉₆
16	₀₉ ["] ₅₆	₅₅ ["] ₃₇	₂₃ ["] ₆₅	₄₆ ["] ₀₇	₅₂ ["] ₁₈	₄₁ ["] ₁₇	₂₉ ["] ₆₆	₄₁ ["] ₁₀	₅₉ ["] ₁₁	₄₆ ["] ₃₁	₁₂ ["] ₄₃	₅₅ ["] ₃₁
17	₀₉ ["] ₅₃	₅₅ ["] ₀₅	₂₄ ["] ₄₈	₄₅ ["] ₇₉	₅₃ ["] ₄₁	₄₁ ["] ₀₂	₃₀ ["] ₉₆	₄₁ ["] ₂₀	₅₉ ["] ₉₀	₄₆ ["] ₆₀	₁₂ ["] ₃₅	₅₅ ["] ₆₄
18	₀₉ ["] ₅₃	₅₄ ["] ₇₀	₂₅ ["] ₃₉	₄₅ ["] ₅₂	₅₄ ["] ₆₉	₄₀ ["] ₉₀	₃₂ ["] ₂₄	₄₁ ["] ₃₂	₆₀ ["] ₆₀	₄₆ ["] ₈₉	₁₂ ["] ₂₄	₅₅ ["] ₉₄
19	₀₉ ["] ₅₉	₅₄ ["] ₃₄	₂₆ ["] ₃₆	₄₅ ["] ₂₆	₅₆ ["] ₀₂	₄₀ ["] ₈₁	₃₃ ["] ₄₈	₄₁ ["] ₄₇	₆₁ ["] ₂₂	₄₇ ["] ₁₈	₁₂ ["] ₁₄	₅₆ ["] ₂₃
20	₀₉ ["] ₇₄	₅₃ ["] ₉₆	₂₇ ["] ₃₈	₄₅ ["] ₀₁	₅₇ ["] ₃₇	₄₀ ["] ₇₄	₃₄ ["] ₆₄	₄₁ ["] ₆₂	₆₁ ["] ₇₆	₄₇ ["] ₄₅	₁₂ ["] ₀₉	₅₆ ["] ₅₀
21	₀₉ ["] ₉₈	₅₃ ["] ₅₉	₂₈ ["] ₄₄	₄₄ ["] ₇₈	₅₈ ["] ₇₄	₄₀ ["] ₆₈	₃₅ ["] ₇₁	₄₁ ["] ₇₈	₆₂ ["] ₂₅	₄₇ ["] ₇₁	₁₂ ["] ₀₉	₅₆ ["] ₇₇
22	₁₀ ["] ₃₀	₅₃ ["] ₂₄	₂₉ ["] ₅₀	₄₄ ["] ₅₈	₆₀ ["] ₀₈	₄₀ ["] ₆₅	₃₆ ["] ₇₀	₄₁ ["] ₉₅	₆₂ ["] ₇₂	₄₇ ["] ₉₆	₁₂ ["] ₁₅	₅₇ ["] ₀₄
23	₁₀ ["] ₆₉	₅₂ ["] ₉₀	₃₀ ["] ₅₅	₄₄ ["] ₄₀	₆₁ ["] ₃₆	₄₀ ["] ₆₄	₃₇ ["] ₆₂	₄₂ ["] ₀₉	₆₃ ["] ₂₁	₄₈ ["] ₁₉	₁₂ ["] ₂₇	₅₇ ["] ₃₄
24	₁₁ ["] ₁₃	₅₂ ["] ₅₇	₃₁ ["] ₅₅	₄₄ ["] ₂₃	₆₂ ["] ₅₈	₄₀ ["] ₆₄	₃₈ ["] ₅₁	₄₂ ["] ₂₂	₆₃ ["] ₇₆	₄₈ ["] ₄₁	₁₂ ["] ₃₈	₅₇ ["] ₆₆
25	₁₁ ["] ₆₀	₅₂ ["] ₂₆	₃₂ ["] ₄₈	₄₄ ["] ₀₆	₆₃ ["] ₇₂	₄₀ ["] ₆₃	₃₉ ["] ₄₁	₄₂ ["] ₃₃	₆₄ ["] ₃₈	₄₈ ["] ₆₃	₁₂ ["] ₄₄	₅₈ ["] ₀₁
26	₁₂ ["] ₀₈	₅₁ ["] ₉₆	₃₃ ["] ₃₅	₄₃ ["] ₉₀	₆₄ ["] ₈₁	₄₀ ["] ₆₂	₄₀ ["] ₃₈	₄₂ ["] ₄₂	₆₅ ["] ₀₆	₄₈ ["] ₈₆	₁₂ ["] ₄₁	₅₈ ["] ₃₈
27	₁₂ ["] ₅₃	₅₁ ["] ₆₉	₃₄ ["] ₁₇	₄₃ ["] ₇₂	₆₅ ["] ₈₄	₄₀ ["] ₅₉	₄₁ ["] ₄₁	₄₂ ["] ₅₂	₆₅ ["] ₇₆	₄₉ ["] ₁₃	₁₂ ["] ₂₈	₅₈ ["] ₇₆
28	₁₂ ["] ₉₃	₅₁ ["] ₄₂	₃₄ ["] ₉₈	₄₃ ["] ₅₂	₆₆ ["] ₈₈	₄₀ ["] ₅₆	₄₂ ["] ₅₀	₄₂ ["] ₆₃	₆₆ ["] ₄₅	₄₉ ["] ₄₂	₁₂ ["] ₀₆	₅₉ ["] ₁₄
29	₁₃ ["] ₂₈	₅₁ ["] ₁₇	₃₅ ["] ₈₁	₄₃ ["] ₃₁	₆₇ ["] ₉₅	₄₀ ["] ₅₂	₄₃ ["] ₆₄	₄₂ ["] ₇₈	₆₇ ["] ₀₇	₄₉ ["] ₇₄	₁₁ ["] ₇₅	₅₉ ["] ₄₉
30	₁₃ ["] ₅₇	₅₀ ["] ₉₀			₆₉ ["] ₀₉	₄₀ ["] ₄₆	₄₄ ["] ₈₀	₄₂ ["] ₉₅	₆₇ ["] ₆₀	₅₀ ["] ₀₇	₁₁ ["] ₃₉	₅₉ ["] ₈₂
31	₁₃ ["] ₈₄	₅₀ ["] ₆₀			₇₀ ["] ₃₂	₄₀ ["] ₄₁	₄₅ ["] ₉₄	₄₃ ["] ₁₄	₆₈ ["] ₀₃	₅₀ ["] ₄₁	₁₁ ["] ₀₁	₆₀ ["] ₁₃
32	₁₄ ["] ₁₂	₅₀ ["] ₂₉			₇₁ ["] ₆₃	₄₀ ["] ₃₆			₆₈ ["] ₃₆	₅₀ ["] ₇₃		

Mean R.A. $18^h 45^m 30^s.400$ Mean Dec. $+89^\circ 02' 07''.96$ Sec $\delta 59.41$ Tan $\delta +59.40$

AT UPPER TRANSIT AT GREENWICH.

 λ Ursæ Minoris. Mag. 6.55

Day.	JULY.		AUGUST.		SEPTEMBER.		OCTOBER.		NOVEMBER.		DECEMBER.	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ^m ^s 18 45	[°] ['] [″] 89 02	^h ^m ^s 18 45	[°] ['] [″] 89 02	^h ^m ^s 18 44	[°] ['] [″] 89 02	^h ^m ^s 18 43	[°] ['] [″] 89 02	^h ^m ^s 18 43	[°] ['] [″] 89 02	^h ^m ^s 18 42	[°] ['] [″] 89 02
1	71.01	00.13	52.77	09.78	78.10	16.93	94.04	20.28	46.23	19.08	68.27	13.30
2	70.65	00.42	52.02	10.04	76.85	17.14	92.41	20.36	44.65	18.92	67.32	13.00
3	70.34	00.70	51.28	10.31	75.52	17.35	90.73	20.41	43.14	18.74	66.46	12.72
4	{70.06} {69.82}	{00.99} {01.28}	50.51	10.60	74.10	17.55	89.02	20.44	41.73	18.56	65.65	12.45
5	69.62	01.57	49.69	10.90	72.61	17.74	87.29	20.45	40.39	18.38	64.86	12.20
6	69.43	01.88	48.79	11.21	71.05	17.91	85.60	20.43	39.13	18.23	64.04	11.98
7	69.22	02.20	47.81	11.52	69.47	18.05	83.99	20.39	37.91	18.09	63.17	11.75
8	68.98	02.54	46.75	11.82	67.89	18.17	82.46	20.34	36.67	17.96	62.24	11.52
9	68.67	02.90	45.60	12.09	66.37	18.27	81.02	20.31	35.37	17.85	61.24	11.29
10	68.27	03.26	44.38	12.34	64.92	18.35	79.61	20.30	34.00	17.74	60.22	11.03
11	67.78	03.62	43.15	12.58	63.54	18.44	78.21	20.30	32.56	17.63	59.22	10.74
12	67.21	03.98	41.93	12.80	62.21	18.55	76.77	20.32	31.07	17.50	58.27	10.43
13	66.55	04.31	40.78	13.01	60.90	18.68	75.26	20.35	29.57	17.33	57.41	10.10
14	65.84	04.62	39.69	13.20	59.57	18.82	73.67	20.37	28.10	17.14	56.65	09.75
15	65.13	04.91	38.66	13.40	58.19	18.99	72.01	20.38	26.69	16.92	55.98	09.40
16	64.45	05.17	37.68	13.62	56.72	19.15	70.30	20.37	25.36	16.69	55.39	09.07
17	63.82	05.43	36.69	13.86	55.17	19.30	68.59	20.33	24.12	16.45	54.86	08.76
18	63.26	05.69	35.66	14.12	53.55	19.44	66.91	20.26	22.96	16.22	54.37	08.46
19	62.77	05.98	34.55	14.39	51.89	19.55	65.28	20.16	21.86	16.00	53.89	08.16
20	62.28	06.28	33.34	14.66	50.22	19.63	63.73	20.05	20.80	15.79	53.40	07.87
21	61.77	06.59	32.05	14.93	48.59	19.69	62.25	19.95	19.76	15.59	52.87	07.60
22	61.20	06.94	30.70	15.16	47.01	19.73	60.84	19.85	18.71	15.40	52.31	07.33
23	60.54	07.29	29.31	15.37	45.49	19.77	59.48	19.76	17.64	15.21	51.70	07.06
24	59.78	07.64	27.92	15.57	44.04	19.82	58.13	19.68	16.53	15.02	51.07	06.76
25	58.92	07.98	26.56	15.74	42.64	19.86	56.79	19.61	15.38	14.83	50.42	06.45
26	57.99	08.28	25.25	15.89	41.27	19.90	55.42	19.55	14.17	14.63	49.78	06.11
27	57.05	08.56	24.00	16.05	39.89	19.95	54.02	19.50	12.92	14.40	49.21	05.74
28	56.12	08.82	22.79	16.20	38.50	20.02	52.56	19.44	11.68	14.16	48.74	05.37
29	55.21	09.06	21.62	16.36	37.08	20.11	51.04	19.38	10.46	13.90	48.38	05.00
30	54.36	09.29	20.46	16.54	35.60	20.20	49.46	19.31	09.32	13.60	48.12	04.63
31	53.55	09.53	19.29	16.73	34.04	20.28	47.84	19.21	08.27	13.30	47.94	04.29
32	52.77	09.78	18.10	16.93			46.23	19.08			47.80	03.97

AT UPPER TRANSIT AT GREENWICH.

Groombridge 3548. Mag. 7.36

Day.	JANUARY.		FEBRUARY.		MARCH.		APRIL.		MAY.		JUNE.	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ^m ^s _{21 12}	[°] ['] [″] _{86° 45'}	^h ^m ^s _{21 12}	[°] ['] [″] _{86° 45'}	^h ^m ^s _{21 12}	[°] ['] [″] _{86° 44'}	^h ^m ^s _{21 12}	[°] ['] [″] _{86° 44'}	^h ^m ^s _{21 13}	[°] ['] [″] _{86° 44'}	^h ^m ^s _{21 13}	[°] ['] [″] _{86° 44'}
1	57 ^s 35	20 [″] 64	51 ^s 18	12 [″] 13	51 ^s 65	63 [″] 22	58 ^s 30	55 [″] 40	08 ^s 62	52 [″] 53	19 ^s 51	55 [″] 41
2	57 ^s 07	20 [″] 46	51 ^s 03	11 [″] 80	51 ^s 71	62 [″] 91	58 ^s 62	55 [″] 18	09 ^s 04	52 [″] 55	19 ^s 81	55 [″] 63
3	56 ^s 78	20 [″] 27	50 ^s 90	11 [″] 46	51 ^s 80	62 [″] 58	58 ^s 95	55 [″] 00	09 ^s 43	52 [″] 58	20 ^s 09	55 [″] 84
4	56 ^s 45	20 [″] 07	50 ^s 79	11 [″] 10	51 ^s 92	62 [″] 24	59 ^s 31	54 [″] 84	09 ^s 81	52 [″] 64	20 ^s 36	56 [″] 03
5	56 ^s 11	19 [″] 84	50 ^s 72	10 [″] 74	52 ^s 07	61 [″] 90	59 ^s 67	54 [″] 70	10 ^s 17	52 [″] 71	20 ^s 61	56 [″] 20
6	55 ^s 78	19 [″] 59	50 ^s 68	10 [″] 38	52 ^s 25	61 [″] 59	60 ^s 02	54 [″] 59	10 ^s 52	52 [″] 78	20 ^s 87	56 [″] 37
7	55 ^s 47	19 [″] 32	50 ^s 67	10 [″] 04	52 ^s 46	61 [″] 30	60 ^s 35	54 [″] 49	10 ^s 84	52 [″] 82	21 ^s 14	56 [″] 53
8	55 ^s 19	19 [″] 03	50 ^s 68	09 [″] 72	52 ^s 68	61 [″] 03	60 ^s 66	54 [″] 39	11 ^s 16	52 [″] 85	21 ^s 43	56 [″] 69
9	54 ^s 94	18 [″] 73	50 ^s 70	09 [″] 42	52 ^s 89	60 [″] 79	60 ^s 96	54 [″] 27	11 ^s 48	52 [″] 87	21 ^s 73	56 [″] 86
10	54 ^s 72	18 [″] 43	50 ^s 72	09 [″] 13	53 ^s 09	60 [″] 55	61 ^s 25	54 [″] 15	11 ^s 82	52 [″] 89	22 ^s 04	57 [″] 06
11	54 ^s 53	18 [″] 16	50 ^s 72	08 [″] 86	53 ^s 27	60 [″] 32	61 ^s 54	54 [″] 02	12 ^s 16	52 [″] 91	22 ^s 36	57 [″] 27
12	54 ^s 35	17 [″] 90	50 ^s 71	08 [″] 58	53 ^s 45	60 [″] 08	61 ^s 84	53 [″] 87	12 ^s 52	52 [″] 93	22 ^s 68	57 [″] 49
13	54 ^s 18	17 [″] 66	50 ^s 69	08 [″] 28	53 ^s 62	59 [″] 83	62 ^s 14	53 [″] 71	12 ^s 89	52 [″] 96	22 ^s 99	57 [″] 74
14	53 ^s 98	17 [″] 42	50 ^s 65	07 [″] 97	53 ^s 79	59 [″] 56	62 ^s 47	53 [″] 55	13 ^s 29	53 [″] 01	23 ^s 29	58 [″] 01
15	53 ^s 77	17 [″] 20	50 ^s 63	07 [″] 64	53 ^s 96	59 [″] 28	62 ^s 83	53 [″] 41	13 ^s 69	53 [″] 08	23 ^s 57	58 [″] 29
16	53 ^s 55	16 [″] 97	50 ^s 62	07 [″] 30	54 ^s 14	58 [″] 99	63 ^s 20	53 [″] 28	14 ^s 09	53 [″] 17	23 ^s 82	58 [″] 57
17	53 ^s 33	16 [″] 71	50 ^s 62	06 [″] 94	54 ^s 34	58 [″] 70	63 ^s 59	53 [″] 17	14 ^s 49	53 [″] 29	24 ^s 04	58 [″] 85
18	53 ^s 10	16 [″] 42	50 ^s 65	06 [″] 58	54 ^s 57	58 [″] 41	63 ^s 98	53 [″] 08	14 ^s 86	53 [″] 42	24 ^s 24	59 [″] 12
19	52 ^s 87	16 [″] 11	50 ^s 69	06 [″] 21	54 ^s 81	58 [″] 13	64 ^s 38	53 [″] 01	15 ^s 22	53 [″] 56	24 ^s 42	59 [″] 38
20	52 ^s 65	15 [″] 78	50 ^s 76	05 [″] 85	55 ^s 08	57 [″] 86	64 ^s 77	52 [″] 97	15 ^s 56	53 [″] 71	24 ^s 61	59 [″] 62
21	52 ^s 46	15 [″] 45	50 ^s 86	05 [″] 51	55 ^s 37	57 [″] 61	65 ^s 15	52 [″] 94	15 ^s 87	53 [″] 84	24 ^s 82	59 [″] 83
22	52 ^s 29	15 [″] 12	50 ^s 98	05 [″] 19	55 ^s 67	57 [″] 37	65 ^s 50	52 [″] 92	16 ^s 16	53 [″] 97	25 ^s 04	60 [″] 05
23	52 ^s 14	14 [″] 78	51 ^s 10	04 [″] 88	55 ^s 96	57 [″] 16	65 ^s 84	52 [″] 90	16 ^s 44	54 [″] 08	25 ^s 27	60 [″] 29
24	52 ^s 02	14 [″] 45	51 ^s 22	04 [″] 59	56 ^s 26	56 [″] 98	66 ^s 16	52 [″] 87	16 ^s 73	54 [″] 17	25 ^s 53	60 [″] 54
25	51 ^s 92	14 [″] 13	51 ^s 33	04 [″] 32	56 ^s 54	56 [″] 82	66 ^s 46	52 [″] 83	17 ^s 04	54 [″] 26	25 ^s 79	60 [″] 82
26	51 ^s 83	13 [″] 82	51 ^s 43	04 [″] 06	56 ^s 80	56 [″] 65	66 ^s 76	52 [″] 77	17 ^s 37	54 [″] 36	26 ^s 05	61 [″] 14
27	51 ^s 75	13 [″] 53	51 ^s 52	03 [″] 79	57 ^s 04	56 [″] 48	67 ^s 08	52 [″] 70	17 ^s 73	54 [″] 47	26 ^s 29	61 [″] 47
28	51 ^s 66	13 [″] 26	51 ^s 59	03 [″] 51	57 ^s 27	56 [″] 29	67 ^s 44	52 [″] 63	18 ^s 11	54 [″] 61	26 ^s 50	61 [″] 80
29	51 ^s 56	12 [″] 99	51 ^s 65	03 [″] 22	57 ^s 50	56 [″] 08	67 ^s 81	52 [″] 57	18 ^s 49	54 [″] 78	26 ^s 68	62 [″] 13
30	51 ^s 44	12 [″] 72			57 ^s 74	55 [″] 85	68 ^s 21	52 [″] 54	18 ^s 86	54 [″] 97	26 ^s 85	62 [″] 44
31	51 ^s 32	12 [″] 44			58 ^s 00	55 [″] 62	68 ^s 62	52 [″] 53	19 ^s 20	55 [″] 19	27 ^s 00	62 [″] 76
32	51 ^s 18	12 [″] 13			58 ^s 30	55 [″] 40			19 ^s 51	55 [″] 41		

Mean R.A. 21^h 13^m 21^s.768 Mean Dec. +86° 45' 14".87 Sec δ 17.66 Tan δ +17.63

APPARENT PLACES OF STARS, 1931.

321

AT UPPER TRANSIT AT GREENWICH.

Groombridge 3548. Mag. 7.36

Day.	JULY.		AUGUST.		SEPTEMBER.		OCTOBER.		NOVEMBER.		DECEMBER.	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ₂₁ ^m ₁₃	[°] ₈₆ ['] ₄₅	^h ₂₁ ^m ₁₃	[°] ₈₆ ['] ₄₅	^h ₂₁ ^m ₁₃	[°] ₈₆ ['] ₄₅	^h ₂₁ ^m ₁₃	[°] ₈₆ ['] ₄₅	^h ₂₁ ^m ₁₂	[°] ₈₆ ['] ₄₅	^h ₂₁ ^m ₁₂	[°] ₈₆ ['] ₄₅
1	^s ₂₇ 00	02 76	^s ₂₉ 67	13 13	^s ₂₆ 64	24 55	^s ₁₈ 74	33 96	^s ₆₆ 79	40 20	^s ₅₃ 98	41 29
2	27 13	03 06	29 66	13 46	26 50	24 91	18 42	34 26	66 32	40 31	53 55	41 19
3	27 26	03 35	29 67	13 78	26 34	25 28	18 07	34 56	65 85	40 39	53 14	41 09
4	27 39	03 62	29 69	14 12	26 15	25 66	17 68	34 83	65 40	40 46	52 76	41 01
5	27 54	03 88	29 71	14 47	25 94	26 04	17 28	35 08	64 96	40 53	52 41	40 93
6	27 71	04 15	29 73	14 83	25 71	26 41	16 87	35 32	64 55	40 59	52 06	40 86
7	27 88	04 43	29 74	15 21	25 44	26 76	16 47	35 53	64 17	40 67	51 71	40 82
8	28 06	04 74	29 73	15 62	25 15	27 10	16 09	35 73	63 79	40 76	51 33	40 78
9	28 25	05 06	29 69	16 02	24 87	27 41	15 73	35 92	63 41	40 86	50 94	40 73
10	28 43	05 39	^{29 63} _{29 54}	^{16 43} _{16 84}	24 60	27 69	15 38	36 12	63 03	40 98	50 53	40 67
11	28 59	05 75	29 42	17 21	24 35	27 97	15 05	36 34	62 61	41 11	50 09	40 59
12	28 73	06 12	29 29	17 57	24 11	28 27	14 73	36 58	62 18	41 22	49 66	40 48
13	28 85	06 49	29 15	17 89	23 88	28 57	14 41	36 83	61 72	41 32	49 24	40 34
14	28 94	06 86	29 04	18 22	23 67	28 89	14 05	37 09	61 24	41 39	48 82	40 19
15	29 00	07 22	28 94	18 55	23 46	29 23	13 68	37 35	60 76	41 43	48 44	40 02
16	29 05	07 56	28 85	18 88	23 23	29 60	13 29	37 60	60 30	41 44	48 07	39 84
17	29 08	07 89	28 80	19 23	22 98	29 96	12 86	37 82	59 84	41 44	47 72	39 66
18	29 11	08 20	28 74	19 59	22 70	30 31	12 42	38 01	59 40	41 43	47 39	39 49
19	29 17	08 51	28 68	19 98	22 40	30 66	11 98	38 19	58 99	41 41	47 08	39 34
20	29 24	08 81	28 59	20 39	22 07	30 97	11 56	38 35	58 59	41 39	46 77	39 18
21	29 34	09 13	28 47	20 80	21 73	31 26	11 14	38 49	58 21	41 38	46 46	39 04
22	29 45	09 47	28 33	21 20	21 39	31 54	10 74	38 63	57 83	41 39	46 14	38 92
23	29 57	09 83	28 16	21 60	21 06	31 79	10 35	38 76	57 46	41 40	45 81	38 79
24	29 67	10 21	27 98	21 96	20 75	32 04	09 98	38 89	57 07	41 42	45 46	38 65
25	29 73	10 61	27 78	22 29	20 46	32 29	09 62	39 04	56 66	41 45	45 10	38 49
26	29 77	11 01	27 59	22 61	20 17	32 53	09 26	39 20	56 24	41 47	44 72	38 31
27	29 78	11 41	27 41	22 93	19 88	32 79	08 89	39 37	55 80	41 48	44 35	38 11
28	29 77	11 78	27 23	23 23	19 61	33 07	08 52	39 55	55 36	41 47	43 98	37 88
29	29 75	12 14	27 07	23 55	19 33	33 36	08 12	39 73	54 89	41 44	43 65	37 64
30	29 72	12 48	26 92	23 88	19 04	33 66	07 70	39 90	54 43	41 38	43 33	37 39
31	29 69	12 81	26 78	24 21	18 74	33 96	07 26	40 06	53 98	41 29	43 04	37 15
32	29 67	13 13	26 64	24 55			06 79	40 20			42 78	36 92

Catalogue Number 1321

Spectrum A3

AT UPPER TRANSIT AT GREENWICH.

39 H Cephei Mag. 5.62

Day.	JANUARY.		FEBRUARY.		MARCH.		APRIL.		MAY.		JUNE.	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ^m ^s	[°] ['] ^{''}	^h ^m ^s	[°] ['] ^{''}	^h ^m ^s	[°] ['] ^{''}	^h ^m ^s	[°] ['] ^{''}	^h ^m ^s	[°] ['] ^{''}	^h ^m ^s	[°] ['] ^{''}
	23 27 86 55	+	23 27 86 55	+	23 27 86 55	+	23 27 86 55	+	23 27 86 55	+	23 27 86 55	+
1	24 ^s 03	52 ["] 98	12 ^s 93	48 ["] 93	07 ^s 33	41 ["] 37	07 ^s 86	31 ["] 83	14 ^s 98	24 ["] 74	26 ^s 47	22 ["] 20
2	23 ^s 66	52 ["] 98	12 ^s 58	48 ["] 73	07 ^s 18	41 ["] 08	08 ^s 00	31 ["] 51	15 ^s 36	24 ["] 56	26 ^s 87	22 ["] 25
3	23 ^s 27	52 ["] 98	12 ^s 23	48 ["] 50	07 ^s 03	40 ["] 76	08 ^s 18	31 ["] 21	15 ^s 74	24 ["] 41	27 ^s 26	22 ["] 30
4	22 ^s 86	52 ["] 97	11 ^s 90	48 ["] 24	06 ^s 91	40 ["] 42	08 ^s 39	30 ["] 92	16 ^s 12	24 ["] 29	27 ^s 61	22 ["] 35
5	22 ^s 41	52 ["] 93	11 ^s 60	47 ["] 98	06 ^s 82	40 ["] 07	08 ^s 62	30 ["] 64	16 ^s 47	24 ["] 18	27 ^s 95	22 ["] 39
6	21 ^s 95	52 ["] 87	11 ^s 34	47 ["] 70	06 ^s 76	39 ["] 72	08 ^s 85	30 ["] 39	16 ^s 81	24 ["] 07	28 ^s 30	22 ["] 41
7	21 ^s 50	52 ["] 78	11 ^s 10	47 ["] 42	06 ^s 74	39 ["] 39	09 ^s 07	30 ["] 16	17 ^s 13	23 ["] 97	28 ^s 64	22 ["] 42
8	21 ^s 06	52 ["] 68	10 ^s 89	47 ["] 15	06 ^s 75	39 ["] 08	09 ^s 26	29 ["] 93	17 ^s 43	23 ["] 86	29 ^s 01	22 ["] 43
9	20 ^s 64	52 ["] 55	10 ^s 70	46 ["] 91	06 ^s 77	38 ["] 78	09 ^s 44	29 ["] 69	17 ^s 72	23 ["] 73	29 ^s 39	22 ["] 44
10	20 ^s 25	52 ["] 42	10 ^s 52	46 ["] 68	06 ^s 80	38 ["] 49	09 ^s 62	29 ["] 46	18 ^s 02	23 ["] 59	29 ^s 78	22 ["] 45
11	19 ^s 89	52 ["] 28	10 ^s 33	46 ["] 45	06 ^s 81	38 ["] 21	09 ^s 78	29 ["] 21	18 ^s 32	23 ["] 44	30 ^s 20	22 ["] 47
12	19 ^s 57	52 ["] 16	10 ^s 13	46 ["] 22	06 ^s 79	37 ["] 94	09 ^s 94	28 ["] 95	18 ^s 66	23 ["] 28	30 ^s 64	22 ["] 52
13	19 ^s 25	52 ["] 05	09 ^s 91	45 ["] 99	06 ^s 76	37 ["] 65	10 ^s 11	28 ["] 68	19 ^s 01	23 ["] 13	31 ^s 08	22 ["] 60
14	18 ^s 94	51 ["] 95	09 ^s 67	45 ["] 75	06 ^s 73	37 ["] 36	10 ^s 29	28 ["] 39	19 ^s 38	22 ["] 99	31 ^s 52	22 ["] 69
15	18 ^s 60	51 ["] 85	09 ^s 42	45 ["] 49	06 ^s 69	37 ["] 05	10 ^s 50	28 ["] 10	19 ^s 78	22 ["] 87	31 ^s 95	22 ["] 80
16	18 ^s 24	51 ["] 76	09 ^s 17	45 ["] 21	06 ^s 66	36 ["] 73	10 ^s 74	27 ["] 83	20 ^s 20	22 ["] 77	32 ^s 36	22 ["] 93
17	17 ^s 87	51 ["] 66	08 ^s 93	44 ["] 91	06 ^s 64	36 ["] 40	11 ^s 00	27 ["] 55	20 ^s 62	22 ["] 69	32 ^s 75	23 ["] 06
18	17 ^s 48	51 ["] 53	08 ^s 71	44 ["] 59	06 ^s 64	36 ["] 05	11 ^s 29	27 ["] 30	21 ^s 04	22 ["] 64	33 ^s 11	23 ["] 20
19	17 ^s 07	51 ["] 39	08 ^s 51	44 ["] 28	06 ^s 67	35 ["] 71	11 ^s 59	27 ["] 06	21 ^s 46	22 ["] 61	33 ^s 43	23 ["] 33
20	16 ^s 67	51 ["] 23	08 ^s 34	43 ["] 96	06 ^s 73	35 ["] 36	11 ^s 91	26 ["] 85	21 ^s 84	22 ["] 58	33 ^s 76	23 ["] 44
21	16 ^s 27	51 ["] 04	08 ^s 19	43 ["] 64	06 ^s 81	35 ["] 02	12 ^s 23	26 ["] 65	22 ^s 21	22 ["] 54	34 ^s 08	23 ["] 54
22	15 ^s 89	50 ["] 85	08 ^s 07	43 ["] 32	06 ^s 91	34 ["] 69	12 ^s 52	26 ["] 48	22 ^s 54	22 ["] 51	34 ^s 43	23 ["] 62
23	15 ^s 53	50 ["] 64	07 ^s 97	43 ["] 00	07 ^s 03	34 ["] 38	12 ^s 79	26 ["] 31	22 ^s 86	22 ["] 47	34 ^s 81	23 ["] 71
24	15 ^s 20	50 ["] 42	07 ^s 89	42 ["] 70	07 ^s 16	34 ["] 08	13 ^s 05	26 ["] 15	23 ^s 18	22 ["] 43	35 ^s 21	23 ["] 81
25	14 ^s 90	50 ["] 20	07 ^s 81	42 ["] 42	07 ^s 29	33 ["] 81	13 ^s 29	25 ["] 97	23 ^s 52	22 ["] 37	35 ^s 63	23 ["] 93
26	14 ^s 62	50 ["] 00	07 ^s 71	42 ["] 16	07 ^s 40	33 ["] 55	13 ^s 52	25 ["] 78	23 ^s 88	22 ["] 30	36 ^s 06	24 ["] 07
27	14 ^s 35	49 ["] 80	07 ^s 60	41 ["] 90	07 ^s 51	33 ["] 29	13 ^s 76	25 ["] 58	24 ^s 26	22 ["] 23	36 ^s 49	24 ["] 24
28	14 ^s 09	49 ["] 61	07 ^s 48	41 ["] 64	07 ^s 58	33 ["] 03	14 ^s 01	25 ["] 36	24 ^s 68	22 ["] 17	36 ^s 91	24 ["] 43
29	13 ^s 83	49 ["] 43	07 ^s 33	41 ["] 37	07 ^s 63	32 ["] 76	14 ^s 30	25 ["] 14	25 ^s 13	22 ["] 14	37 ^s 29	24 ["] 63
30	13 ^s 55	49 ["] 27			07 ^s 68	32 ["] 47	14 ^s 62	24 ["] 93	25 ^s 58	22 ["] 14	37 ^s 66	24 ["] 83
31	13 ^s 25	49 ["] 10			07 ^s 75	32 ["] 16	14 ^s 98	24 ["] 74	26 ^s 04	22 ["] 16	38 ^s 00	25 ["] 04
32	12 ^s 93	48 ["] 93			07 ^s 86	31 ["] 83			26 ^s 47	22 ["] 20		

Mean R.A. 23^h 27^m 41^s.539 Mean Dec. +86° 55' 36".88 Sec δ 18.65 Tan δ +18.63

AT UPPER TRANSIT AT GREENWICH.

39 H Cephei. Mag. 5.62

Day.	JULY.		AUGUST.		SEPTEMBER.		OCTOBER.		NOVEMBER.		DECEMBER.	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ₂₃ ^m ₂₇	[°] ₈₆ ['] ₅₅	^h ₂₃ ^m ₂₇	[°] ₈₆ ['] ₅₅	^h ₂₃ ^m ₂₇	[°] ₈₆ ['] ₅₅	^h ₂₃ ^m ₂₇	[°] ₈₆ ['] ₅₅	^h ₂₃ ^m ₂₇	[°] ₈₆ ['] ₅₆	^h ₂₃ ^m ₂₇	[°] ₈₆ ['] ₅₆
1	^s _{38.00}	["] _{25.04}	^s _{47.35}	["] _{32.62}	^s _{52.38}	["] _{43.34}	^s _{52.02}	["] _{55.33}	^s _{45.92}	["] _{06.26}	^s _{35.57}	["] _{13.29}
2	^s _{38.31}	["] _{25.23}	^s _{47.57}	["] _{32.89}	^s _{52.49}	["] _{43.70}	^s _{51.95}	["] _{55.74}	^s _{45.58}	["] _{06.58}	^s _{35.13}	["] _{13.40}
3	^s _{38.60}	["] _{25.41}	^s _{47.80}	["] _{33.17}	^s _{52.61}	["] _{44.07}	^s _{51.84}	["] _{56.16}	^s _{45.23}	["] _{06.88}	^s _{34.72}	["] _{13.51}
4	^s _{38.91}	["] _{25.57}	^s _{48.04}	["] _{33.45}	^s _{52.72}	["] _{44.46}	^s _{51.70}	["] _{56.58}	^s _{44.88}	["] _{07.15}	^s _{34.33}	["] _{13.61}
5	^s _{39.22}	["] _{25.74}	^s _{48.30}	["] _{33.73}	^s _{52.82}	["] _{44.87}	^s _{51.52}	["] _{57.00}	^s _{44.56}	["] _{07.41}	^s _{33.96}	["] _{13.72}
6	^s _{39.55}	["] _{25.90}	^s _{48.57}	["] _{34.03}	^s _{52.90}	["] _{45.30}	^s _{51.32}	["] _{57.38}	^s _{44.25}	["] _{07.66}	^s _{33.62}	["] _{13.84}
7	^s _{39.89}	["] _{26.06}	^s _{48.85}	["] _{34.35}	^s _{52.94}	["] _{45.73}	^s _{51.12}	["] _{57.74}	^s _{43.96}	["] _{07.90}	^s _{33.28}	["] _{13.97}
8	^s _{40.25}	["] _{26.22}	^s _{49.11}	["] _{34.69}	^s _{52.95}	["] _{46.16}	^s _{50.92}	["] _{58.08}	^s _{43.71}	["] _{08.15}	^s _{32.93}	["] _{14.12}
9	^s _{40.63}	["] _{26.40}	^s _{49.36}	["] _{35.05}	^s _{52.93}	["] _{46.57}	^s _{50.74}	["] _{58.41}	^s _{43.46}	["] _{08.42}	^s _{32.55}	["] _{14.28}
10	^s _{41.02}	["] _{26.60}	^s _{49.57}	["] _{35.43}	^s _{52.90}	["] _{46.96}	^s _{50.58}	["] _{58.75}	^s _{43.20}	["] _{08.71}	^s _{32.15}	["] _{14.44}
11	^s _{41.40}	["] _{26.83}	^s _{49.75}	["] _{35.82}	^s _{52.86}	["] _{47.34}	^s _{50.45}	["] _{59.09}	^s _{42.93}	["] _{09.00}	^s _{31.73}	["] _{14.58}
12	^s _{41.78}	["] _{27.07}	^s _{49.90}	["] _{36.20}	^s _{52.82}	["] _{47.70}	^s _{50.34}	["] _{59.44}	^s _{42.61}	["] _{09.31}	^s _{31.28}	["] _{14.69}
13	^s _{42.14}	["] _{27.34}	^s _{50.03}	["] _{36.57}	^s _{52.81}	["] _{48.05}	^s _{50.23}	["] _{59.81}	^s _{42.28}	["] _{09.61}	^s _{30.82}	["] _{14.77}
14	^s _{42.46}	["] _{27.62}	^s _{50.15}	["] _{36.91}	^s _{52.86}	["] _{48.77}	^s _{50.10}	["] _{60.20}	^s _{41.92}	["] _{09.88}	^s _{30.36}	["] _{14.84}
15	^s _{42.76}	["] _{27.90}	^s _{50.26}	["] _{37.24}	^s _{52.91}	["] _{49.16}	^s _{49.95}	["] _{60.60}	^s _{41.53}	["] _{10.14}	^s _{29.90}	["] _{14.88}
16	^s _{43.04}	["] _{28.18}	^s _{50.40}	["] _{37.55}	^s _{52.95}	["] _{49.58}	^s _{49.77}	["] _{61.00}	^s _{41.13}	["] _{10.38}	^s _{29.47}	["] _{14.91}
17	^s _{43.29}	["] _{28.44}	^s _{50.56}	["] _{37.87}	^s _{52.99}	["] _{49.99}	^s _{49.56}	["] _{61.39}	^s _{40.73}	["] _{10.60}	^s _{29.05}	["] _{14.93}
18	^s _{43.53}	["] _{28.68}	^s _{50.74}	["] _{38.19}	^s _{52.98}	["] _{50.42}	^s _{49.31}	["] _{61.75}	^s _{40.35}	["] _{10.79}	^s _{28.64}	["] _{14.94}
19	^s _{43.78}	["] _{28.90}	^s _{50.95}	["] _{38.53}	^s _{52.95}	["] _{50.84}	^s _{49.05}	["] _{62.11}	^s _{39.98}	["] _{10.98}	^s _{28.27}	["] _{14.95}
20	^s _{44.06}	["] _{29.12}	^s _{51.16}	["] _{38.89}	^s _{52.89}	["] _{51.27}	^s _{48.79}	["] _{62.45}	^s _{39.63}	["] _{11.16}	^s _{27.91}	["] _{14.97}
21	^s _{44.36}	["] _{29.34}	^s _{51.36}	["] _{39.27}	^s _{52.79}	["] _{51.67}	^s _{48.52}	["] _{62.76}	^s _{39.30}	["] _{11.34}	^s _{27.55}	["] _{15.00}
22	^s _{44.68}	["] _{29.58}	^s _{51.54}	["] _{39.67}	^s _{52.69}	["] _{52.05}	^s _{48.26}	["] _{63.05}	^s _{38.98}	["] _{11.52}	^s _{27.18}	["] _{15.05}
23	^s _{45.04}	["] _{29.85}	^s _{51.68}	["] _{40.08}	^s _{52.58}	["] _{52.42}	^s _{48.02}	["] _{63.35}	^s _{38.66}	["] _{11.71}	^s _{26.80}	["] _{15.10}
24	^s _{45.39}	["] _{30.14}	^s _{51.79}	["] _{40.48}	^s _{52.47}	["] _{52.77}	^s _{47.79}	["] _{63.64}	^s _{38.34}	["] _{11.91}	^s _{26.40}	["] _{15.16}
25	^s _{45.72}	["] _{30.45}	^s _{51.88}	["] _{40.88}	^s _{52.38}	["] _{53.13}	^s _{47.58}	["] _{63.92}	^s _{38.01}	["] _{12.12}	^s _{25.98}	["] _{15.21}
26	^s _{46.02}	["] _{30.77}	^s _{51.94}	["] _{41.27}	^s _{52.30}	["] _{53.48}	^s _{47.38}	["] _{64.22}	^s _{37.66}	["] _{12.33}	^s _{25.53}	["] _{15.24}
27	^s _{46.30}	["] _{31.10}	^s _{52.00}	["] _{41.64}	^s _{52.23}	["] _{53.82}	^s _{47.18}	["] _{64.54}	^s _{37.28}	["] _{12.55}	^s _{25.06}	["] _{15.24}
28	^s _{46.55}	["] _{31.43}	^s _{52.05}	["] _{41.99}	^s _{52.17}	["] _{54.17}	^s _{46.97}	["] _{64.87}	^s _{36.88}	["] _{12.76}	^s _{24.59}	["] _{15.23}
29	^s _{46.76}	["] _{31.75}	^s _{52.11}	["] _{42.33}	^s _{52.12}	["] _{54.54}	^s _{46.75}	["] _{65.22}	^s _{36.46}	["] _{12.96}	^s _{24.13}	["] _{15.20}
30	^s _{46.96}	["] _{32.06}	^s _{52.19}	["] _{42.67}	^s _{52.07}	["] _{54.93}	^s _{46.50}	["] _{65.57}	^s _{36.02}	["] _{13.14}	^s _{23.69}	["] _{15.14}
31	^s _{47.16}	["] _{32.35}	^s _{52.27}	["] _{43.00}	^s _{52.02}	["] _{55.33}	^s _{46.23}	["] _{65.92}	^s _{35.57}	["] _{13.29}	^s _{23.28}	["] _{15.07}
32	^s _{47.35}	["] _{32.62}	^s _{52.38}	["] _{43.34}			^s _{45.92}	["] _{66.26}			^s _{22.90}	["] _{15.00}

Catalogue Number 1468

Spectrum Fo

AT UPPER TRANSIT AT GREENWICH.

o Octantis. Mag. 7.22

Day.	JANUARY.		FEBRUARY.		MARCH.		APRIL.		MAY.		JUNE.	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ^m ^s 00 12 88° 45'		^h ^m ^s 00 11 88° 44'		^h ^m ^s 00 11 88° 44'		^h ^m ^s 00 11 88° 44'		^h ^m ^s 00 11 88° 44'		^h ^m ^s 00 12 88° 44'	
1	33.82	09.82	66.67	63.13	51.45	53.61	48.28	41.51	57.96	30.54	19.09	21.93
2	32.74	09.66	66.09	62.81	51.27	53.22	48.40	41.15	58.34	30.22	19.90	21.68
3	31.74	09.48	65.54	62.50	51.10	52.85	48.47	40.79	58.72	29.88	20.79	21.44
4	30.80	09.29	64.99	62.21	50.92	52.49	48.49	40.41	59.15	29.52	21.74	21.21
5	29.94	09.11	64.40	61.94	50.67	52.15	48.50	40.03	59.66	29.15	22.72	21.01
6	29.14	08.94	63.75	61.67	50.36	51.81	48.53	39.62	60.24	28.79	23.72	20.84
7	28.34	08.78	63.03	61.39	49.99	51.44	48.62	39.20	60.90	28.44	24.72	20.67
8	27.52	08.64	62.26	61.09	49.60	51.06	48.79	38.76	61.61	28.11	25.70	20.52
9	26.65	08.52	61.48	60.77	49.20	50.66	49.04	38.34	62.36	27.80	26.63	20.39
10	25.71	08.38	60.71	60.44	48.84	50.25	49.36	37.93	63.11	27.51	27.50	20.28
11	24.68	08.22	59.99	60.08	48.55	49.84	49.73	37.54	63.86	27.23	28.33	20.16
12	23.61	08.05	59.34	59.72	48.34	49.41	50.13	37.16	64.58	26.97	29.13	20.03
13	22.54	07.86	58.75	59.36	48.20	48.97	50.54	36.80	65.27	26.71	29.91	19.89
14	21.50	07.66	58.24	58.99	48.14	48.55	50.92	36.45	65.90	26.45	30.68	19.74
15	20.51	07.43	57.80	58.63	48.12	48.15	51.27	36.12	66.50	26.19	31.49	19.58
16	19.58	07.18	57.39	58.29	48.12	47.76	51.59	35.79	67.06	25.93	32.36	19.41
17	18.73	06.93	56.99	57.96	48.11	47.38	51.88	35.46	67.62	25.66	33.30	19.24
18	17.94	06.69	56.57	57.64	48.09	47.01	52.13	35.12	68.21	25.38	34.32	19.08
19	17.19	06.46	56.13	57.33	48.04	46.66	52.37	34.77	68.85	25.08	35.39	18.94
20	16.46	06.23	55.66	57.02	47.93	46.31	52.61	34.41	69.55	24.78	36.49	18.82
21	15.72	06.01	55.15	56.70	47.80	45.95	52.88	34.04	70.33	24.48	37.58	18.72
22	14.97	05.80	54.59	56.37	47.65	45.58	53.21	33.64	71.20	24.19	38.63	18.66
23	14.19	05.59	54.02	56.02	47.48	45.18	53.62	33.23	72.11	23.92	39.60	18.60
24	13.37	05.38	53.45	55.66	47.33	44.78	54.12	32.85	73.04	23.67	40.49	18.55
25	12.50	05.16	52.90	55.28	47.23	44.36	54.71	32.46	73.96	23.44	41.32	18.50
26	11.59	04.94	52.42	54.87	47.21	43.92	55.33	32.09	74.82	23.24	42.11	18.43
27	10.66	04.69	52.01	54.46	47.27	43.48	55.95	31.75	75.60	23.04	42.92	18.35
28	09.75	04.41	51.69	54.03	47.42	43.04	56.54	31.44	76.31	22.85	43.77	18.26
29	08.86	04.11	51.45	53.61	47.62	42.63	57.08	31.14	76.99	22.65	44.67	18.15
30	08.04	03.79			47.85	42.24	57.55	30.84	77.65	22.43	45.64	18.05
31	07.31	03.45			48.09	41.86	57.96	30.54	78.34	22.19	46.66	17.96
32	06.67	03.13			48.28	41.51			79.09	21.93		

Mean R.A. 00^h 12^m 16^s.306 Mean Dec. -88° 44' 47".80 Sec δ 45.72 Tan δ -45.71

AT UPPER TRANSIT AT GREENWICH.

o Octantis. Mag. 7.22

Day.	JULY.		AUGUST.		SEPTEMBER.		OCTOBER.		NOVEMBER.		DECEMBER.	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ₀₀ ^m ₁₂ ^s ₈₈ [°] ₄₄	—	^h ₀₀ ^m ₁₃ ^s ₈₈ [°] ₄₄	—	^h ₀₀ ^m ₁₃ ^s ₈₈ [°] ₄₄	—	^h ₀₀ ^m ₁₃ ^s ₈₈ [°] ₄₄	—	^h ₀₀ ^m ₁₃ ^s ₈₈ [°] ₄₄	—	^h ₀₀ ^m ₁₂ ^s ₈₈ [°] ₄₄	—
1	46.66	17.96	15.62	19.28	36.36	25.62	42.03	34.71	30.73	43.26	66.81	48.11
2	47.73	17.89	16.53	19.45	36.71	25.91	41.85	34.98	30.24	43.47	65.87	48.20
3	48.82	17.85	17.38	19.63	37.03	26.18	41.71	35.24	29.75	43.70	64.96	48.31
4	49.91	17.84	18.16	19.81	37.33	26.45	41.62	35.50	29.24	43.94	63.97	48.41
5	50.97	17.85	18.89	19.99	37.60	26.70	41.58	35.76	28.66	44.19	62.89	48.50
6	51.99	17.87	19.57	20.17	37.93	26.93	41.56	36.04	27.99	44.44	61.76	48.56
7	52.95	17.89	20.22	20.34	38.30	27.17	41.53	36.34	27.23	44.69	60.61	48.59
8	53.85	17.92	20.86	20.49	38.72	27.41	41.46	36.66	26.38	44.92	59.48	48.60
9	54.72	17.95	21.53	20.62	39.19	27.66	41.31	37.00	25.49	45.12	58.40	48.59
10	55.54	17.97	22.25	20.75	39.67	27.93	41.06	37.34	24.58	45.31	57.39	48.57
11	56.35	17.98	23.03	20.87	40.13	28.23	40.72	37.67	23.70	45.48	56.45	48.55
12	57.18	17.97	23.86	21.01	40.53	28.54	40.30	37.99	22.88	45.62	55.55	48.53
13	58.04	17.95	24.73	21.17	40.84	28.87	39.84	38.29	22.12	45.75	54.68	48.52
14	58.96	17.93	25.60	21.35	41.05	29.20	39.37	38.56	21.40	45.89	53.81	48.53
15	59.96	17.93	26.44	21.55	41.18	29.53	38.95	38.80	20.71	46.04	52.91	48.55
16	61.02	17.94	27.21	21.79	41.25	29.84	38.57	39.04	20.03	46.21	51.96	48.57
17	62.10	17.97	27.90	22.03	41.29	30.13	38.24	39.29	19.33	46.39	50.96	48.59
18	63.18	18.03	28.50	22.27	41.34	30.39	37.95	39.55	18.59	46.57	49.91	48.60
19	64.23	18.10	29.02	22.50	41.44	30.65	37.69	39.82	17.79	46.76	48.81	48.60
20	65.20	18.20	29.50	22.73	41.59	30.91	37.41	40.10	16.92	46.95	47.67	48.58
21	66.09	18.30	29.98	22.94	41.79	31.17	37.08	40.40	15.99	47.14	46.52	48.54
22	66.90	18.40	30.49	23.13	42.01	31.45	36.71	40.71	15.01	47.31	45.38	48.48
23	67.65	18.48	31.05	23.32	42.24	31.75	36.27	41.02	13.99	47.46	44.28	48.39
24	68.39	18.55	31.66	23.51	42.44	32.06	35.76	41.33	12.96	47.58	43.23	48.29
25	69.14	18.62	32.32	23.72	{42.60}	{32.40}	35.18	41.63	11.93	47.68	42.25	48.18
26	69.95	18.68	33.00	23.94	42.73	33.09	34.53	41.92	10.94	47.76	41.34	48.07
27	70.82	18.74	33.69	24.18	42.69	33.43	33.85	42.19	10.00	47.82	40.47	47.96
28	71.74	18.82	34.34	24.44	42.58	33.77	33.17	42.43	09.12	47.88	39.63	47.87
29	72.71	18.90	34.94	24.73	42.42	34.10	32.50	42.65	08.30	47.94	38.77	47.79
30	73.69	19.00	35.48	25.02	42.22	34.41	31.86	42.86	07.50	48.02	37.86	47.71
31	74.67	19.13	35.95	25.32	42.03	34.71	31.27	43.06	06.71	48.11	36.87	47.64
32	75.62	19.28	36.36	25.62			30.73	43.26			35.81	47.56

AT UPPER TRANSIT AT GREENWICH.

9 B Octantis. Mag. 7.76

Day.	JANUARY.		FEBRUARY.		MARCH.		APRIL.		MAY.		JUNE.	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ^m ^s 02 30 86 01	—	^h ^m ^s 02 30 86 01	—	^h ^m ^s 02 30 86 01	—	^h ^m ^s 02 30 86 01	—	^h ^m ^s 02 30 86 01	—	^h ^m ^s 02 30 86 01	—
1	65°79	49°54	55°31	49°35	46°32	44°52	39°01	35°22	35°71	24°36	36°83	13°25
2	65°43	49°63	54°99	49°20	46°06	44°23	38°84	34°91	35°65	24°02	36°93	12°89
3	65°08	49°69	54°69	49°06	45°81	43°96	38°67	34°60	35°58	23°67	37°05	12°52
4	64°75	49°72	54°39	48°93	45°56	43°71	38°48	34°30	35°51	23°30	37°19	12°16
5	64°44	49°73	54°10	48°81	45°31	43°48	38°28	33°98	35°45	22°90	37°35	11°80
6	64°15	49°75	53°78	48°71	45°04	43°25	38°07	33°64	35°42	22°49	37°52	11°46
7	63°86	49°77	53°44	48°63	44°76	43°03	37°87	33°27	35°41	22°08	37°70	11°14
8	63°57	49°81	53°10	48°55	44°45	42°80	37°70	32°89	35°43	21°67	37°88	10°84
9	63°28	49°87	52°72	48°44	44°14	42°54	37°54	32°50	35°46	21°27	38°05	10°56
10	62°96	49°96	52°34	48°32	43°83	42°28	37°41	32°10	35°51	20°89	38°23	10°29
11	62°62	50°05	51°97	48°17	43°53	41°99	37°30	31°71	35°56	20°52	38°39	10°03
12	62°26	50°12	51°61	48°00	43°25	41°67	37°20	31°33	35°60	20°16	38°53	09°77
13	61°89	50°17	51°27	47°81	42°99	41°35	37°11	30°95	35°64	19°82	38°67	09°51
14	61°51	50°19	50°95	47°60	42°76	41°02	37°03	30°59	35°68	19°50	38°80	09°22
15	61°14	50°19	50°64	47°40	42°54	40°69	36°94	30°24	35°70	19°17	38°93	08°93
16	60°78	50°16	50°35	47°19	42°32	40°38	36°85	29°92	35°72	18°85	39°08	08°62
17	60°43	50°13	50°07	47°00	42°12	40°08	36°74	29°59	35°72	18°52	39°25	08°30
18	60°10	50°08	49°79	46°83	41°91	39°79	36°62	29°26	35°72	18°17	39°44	07°97
19	59°78	50°03	49°50	46°66	41°71	39°51	36°49	28°92	35°74	17°80	39°65	07°65
20	59°47	49°99	49°21	46°49	41°49	39°24	36°36	28°57	35°78	17°42	39°89	07°34
21	59°17	49°95	48°90	46°33	41°26	38°97	36°23	28°19	35°83	17°02	40°13	07°06
22	58°87	49°93	48°59	46°17	41°02	38°69	36°11	27°80	35°91	16°61	40°37	06°81
23	58°56	49°91	48°26	46°00	40°77	38°40	36°01	27°40	36°01	16°21	40°60	06°58
24	58°22	49°90	47°91	45°80	40°51	38°10	35°94	26°98	36°13	15°84	40°81	06°36
25	57°88	49°89	47°56	45°59	40°26	37°77	35°89	26°56	36°25	15°48	41°00	06°16
26	57°53	49°87	47°22	45°35	40°02	37°41	35°86	26°14	36°37	15°14	41°19	05°96
27	57°15	49°83	46°90	45°09	39°81	37°04	35°84	25°76	36°47	14°83	41°37	05°73
28	56°77	49°79	46°60	44°80	39°62	36°66	35°83	25°38	36°56	14°53	41°56	05°48
29	56°39	49°72	46°32	44°52	39°46	36°28	35°80	25°03	36°64	14°23	41°76	05°23
30	56°02	49°62			39°31	35°91	35°76	24°70	36°70	13°92	41°98	04°97
31	55°65	49°49			39°16	35°56	35°71	24°36	36°76	13°60	42°21	04°71
32	55°31	49°35			39°01	35°22			36°83	13°25		

Mean R.A. 02^h 30^m 49^s.510 Mean Dec. —86° 01' 34".72 Sec δ 14.43 Tan δ —14.40

AT UPPER TRANSIT AT GREENWICH.

9 B Octantis. Mag. 7.76

Day.	JULY.		AUGUST.		SEPTEMBER.		OCTOBER.		NOVEMBER.		DECEMBER.	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ₀₂ ^m ₃₀ ^s ₈₆ [°] ₀₁	—	^h ₀₂ ^m ₃₀ ^s ₈₆ [°] ₀₁	—	^h ₀₂ ^m ₃₀ ^s ₈₆ [°] ₀₁	—	^h ₀₂ ^m ₃₁ ^s ₈₆ [°] ₀₁	—	^h ₀₂ ^m ₃₁ ^s ₈₆ [°] ₀₁	—	^h ₀₂ ^m ₃₀ ^s ₈₆ [°] ₀₁	—
1	42.21	04.71	50.80	00.27	59.85	01.55	06.28	07.74	08.29	17.30	64.81	25.96
2	42.47	04.45	51.12	00.24	60.10	01.73	06.39	08.02	08.27	17.56	64.65	26.21
3	42.74	04.21	51.44	00.22	60.33	01.91	06.51	08.28	08.25	17.83	64.48	26.47
4	43.02	03.99	51.75	00.22	60.56	02.07	06.63	08.54	08.24	18.14	64.28	26.76
5	43.31	03.79	52.03	00.24	60.78	02.22	06.77	08.78	08.23	18.47	64.06	27.04
6	43.59	03.61	52.31	00.25	61.01	02.35	06.91	09.01	08.21	18.81	63.80	27.31
7	43.86	03.45	52.58	00.26	61.24	02.48	07.06	09.24	08.15	19.16	63.53	27.56
8	44.12	03.30	52.84	00.25	61.49	02.60	07.22	09.49	08.06	19.51	63.25	27.78
9	44.37	03.16	53.11	00.23	61.76	02.72	07.37	09.77	07.94	19.86	62.97	27.98
10	44.60	03.02	53.38	00.20	62.04	02.85	07.52	10.07	07.81	20.19	62.71	28.16
11	44.83	02.87	53.66	00.16	62.32	03.01	07.63	10.40	07.67	20.49	62.47	28.32
12	45.05	02.70	53.97	00.12	62.60	03.20	07.72	10.74	07.55	20.78	62.24	28.48
13	45.28	02.53	54.29	00.10	62.85	03.41	07.78	11.08	07.44	21.04	62.02	28.65
14	45.53	02.34	54.63	00.08	63.07	03.64	07.82	11.41	07.33	21.30	61.80	28.82
15	45.80	02.15	54.96	00.09	63.29	03.88	07.85	11.72	07.24	21.56	61.58	29.01
16	46.09	01.95	55.29	00.13	63.48	04.12	07.88	12.02	07.17	21.83	61.34	29.22
17	46.40	01.76	55.60	00.20	63.66	04.35	07.93	12.30	07.09	22.11	61.09	29.44
18	46.72	01.61	55.89	00.28	63.83	04.56	08.00	12.56	07.00	22.41	60.82	29.65
19	47.04	01.47	56.16	00.37	64.00	04.76	08.07	12.82	06.90	22.72	60.55	29.86
20	47.36	01.36	56.42	00.47	64.19	04.95	08.15	13.09	06.77	23.05	60.25	30.06
21	47.65	01.28	56.66	00.54	64.39	05.14	08.23	13.39	06.62	23.38	59.94	30.25
22	47.92	01.20	56.91	00.60	64.61	05.33	08.31	13.70	06.46	23.70	59.61	30.41
23	48.18	01.13	57.18	00.65	64.83	05.53	08.37	14.03	06.28	24.01	59.28	30.55
24	48.43	01.05	57.45	00.69	65.06	05.76	08.43	14.38	06.09	24.30	58.97	30.67
25	48.67	00.95	57.74	00.74	65.29	06.00	08.46	14.73	05.88	24.58	58.66	30.77
26	48.92	00.85	58.04	00.79	65.50	06.26	08.47	15.08	05.68	24.84	58.37	30.85
27	49.19	00.74	58.36	00.87	65.69	06.54	08.46	15.44	05.48	25.07	58.09	30.93
28	49.49	00.62	58.68	00.97	65.87	06.84	08.43	15.79	05.30	25.30	57.83	31.02
29	49.80	00.51	59.00	01.09	66.03	07.15	08.40	16.14	05.13	25.51	57.56	31.12
30	50.12	00.40	59.29	01.24	66.17	07.45	{08.35} {08.32}	{16.45} {16.75}	04.97	25.73	57.29	31.24
31	50.46	00.32	59.58	01.39	66.28	07.74	08.29	17.03	04.81	25.96	57.00	31.37
32	50.80	00.27	59.85	01.55			08.29	17.30			56.68	31.52

AT UPPER TRANSIT AT GREENWICH.

10 B Octantis. Mag. 8.35

Day.	JANUARY.		FEBRUARY.		MARCH.		APRIL.		MAY.		JUNE.	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ^m ^s [°] [']		^h ^m ^s [°] [']		^h ^m ^s [°] [']		^h ^m ^s [°] [']		^h ^m ^s [°] [']		^h ^m ^s [°] [']	
	02 47 88 27		02 46 88 27		02 46 88 26		02 46 88 26		02 46 88 26		02 46 88 26	
1	48.68	06.66	81.26	07.10	57.03	62.86	36.44	54.11	25.86	43.60	26.36	32.56
2	47.76	06.76	80.40	06.97	56.30	62.59	35.97	53.82	25.61	43.27	26.51	32.21
3	46.85	06.84	79.58	06.85	55.61	62.34	35.46	53.53	25.34	42.92	26.72	31.84
4	45.99	06.88	78.80	06.74	54.94	62.11	34.90	53.24	25.08	42.55	26.99	31.48
5	45.17	06.91	78.01	06.65	54.24	61.89	34.31	52.93	24.85	42.17	27.32	31.12
6	44.40	06.95	77.17	06.57	53.51	61.69	33.71	52.60	24.68	41.77	27.69	30.77
7	43.66	07.00	76.28	06.51	52.73	61.49	33.13	52.25	24.57	41.36	28.08	30.44
8	42.92	07.06	75.34	06.44	51.90	61.28	32.60	51.89	24.52	40.95	28.48	30.13
9	42.17	07.14	74.37	06.36	51.05	61.05	32.12	51.52	24.53	40.55	28.87	29.83
10	41.36	07.23	73.37	06.26	50.20	60.80	31.69	51.14	24.57	40.18	29.24	29.55
11	40.49	07.32	72.37	06.14	49.38	60.53	31.32	50.76	24.62	39.82	29.59	29.29
12	39.56	07.41	71.40	06.00	48.58	60.24	31.00	50.39	24.69	39.47	29.91	29.02
13	38.60	07.49	70.47	05.82	47.84	59.93	30.70	50.03	24.74	39.13	30.20	28.74
14	37.62	07.54	69.59	05.64	47.17	59.62	30.42	49.68	24.76	38.80	30.48	28.46
15	36.63	07.57	68.76	05.46	46.54	59.32	30.13	49.34	24.75	38.48	30.75	28.17
16	35.67	07.58	67.97	05.28	45.94	59.02	29.83	49.01	24.72	38.16	31.04	27.86
17	34.75	07.57	67.20	05.10	45.36	58.74	29.50	48.69	24.67	37.83	31.38	27.54
18	33.88	07.55	66.43	04.94	44.79	58.46	29.13	48.37	24.61	37.48	31.80	27.20
19	33.04	07.53	65.67	04.78	44.21	58.19	28.74	48.05	24.56	37.11	32.28	26.87
20	32.23	07.50	64.89	04.63	43.60	57.94	28.34	47.71	24.55	36.72	32.81	26.55
21	31.43	07.48	64.07	04.49	42.96	57.68	27.94	47.36	24.60	36.32	33.37	26.26
22	30.63	07.47	63.22	04.35	42.29	57.42	27.56	46.99	24.71	35.92	33.93	25.99
23	29.82	07.47	62.33	04.20	41.59	57.15	27.22	46.59	24.87	35.53	34.47	25.76
24	28.98	07.49	61.40	04.04	40.87	56.86	26.93	46.17	25.09	35.15	34.97	25.53
25	28.09	07.50	60.46	03.85	40.16	56.55	26.72	45.76	25.33	34.80	35.41	25.31
26	27.16	07.51	59.54	03.64	39.47	56.22	26.57	45.35	25.57	34.46	35.81	25.09
27	26.18	07.49	58.65	03.40	38.84	55.88	26.45	44.96	25.79	34.15	36.21	24.87
28	25.18	07.45	57.81	03.13	38.27	55.51	26.35	44.59	25.96	33.84	36.61	24.63
29	24.15	07.39	57.03	02.86	37.76	55.14	26.23	44.24	26.08	33.54	37.05	24.37
30	23.14	07.31			37.30	54.77	26.07	43.92	26.16	33.23	37.53	24.10
31	22.18	07.22			36.87	54.43	25.86	43.60	26.25	32.91	38.07	23.83
32	21.26	07.10			36.44	54.11			26.36	32.56		

Mean R.A. 02^h 47^m 03^s.969 Mean Dec. -88° 26' 53".13 Sec δ 36.92 Tan δ -36.91

AT UPPER TRANSIT AT GREENWICH.

10 B Octantis. Mag. 8.35

Day.	JULY.		AUGUST.		SEPTEMBER.		OCTOBER.		NOVEMBER.		DECEMBER.	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ^m ^s _{02 46 88 26}	^h ^m ^s _{02 46 88 26}	^h ^m ^s _{02 46 88 26}	^h ^m ^s _{02 46 88 26}	^h ^m ^s _{02 47 88 26}	^h ^m ^s _{02 47 88 26}	^h ^m ^s _{02 47 88 26}	^h ^m ^s _{02 47 88 26}	^h ^m ^s _{02 47 88 26}	^h ^m ^s _{02 47 88 26}	^h ^m ^s _{02 47 88 26}	^h ^m ^s _{02 47 88 26}
1	38°07	23°83	58°66	18°97	21°56	19°72	38°71	25°46	45°00	34°53	37°23	43°61
2	38°67	23°56	59°49	18°91	22°23	19°88	39°03	25°73	44°98	34°81	36°85	43°87
3	39°31	23°30	60°29	18°88	22°85	20°03	39°35	25°99	{44°99} {45°02}	{35°08} {35°36}	36°45	44°15
4	39°98	23°07	61°07	18°86	23°44	20°18	39°67	26°23	45°06	35°66	35°97	44°44
5	40°66	22°87	61°82	18°85	24°01	20°32	40°02	26°45	45°08	35°98	35°43	44°73
6	41°33	22°68	62°52	18°84	24°59	20°45	40°41	26°67	45°05	36°31	34°81	45°01
7	41°98	22°50	63°18	18°83	25°19	20°55	40°83	26°90	44°95	36°66	34°13	45°28
8	42°60	22°34	63°82	18°81	25°83	20°65	41°27	27°15	44°78	37°01	33°43	45°53
9	43°20	22°19	64°46	18°79	26°50	20°75	41°71	27°43	44°54	37°36	32°74	45°76
10	43°76	22°04	65°12	18°75	27°22	20°86	42°13	27°73	44°24	37°69	32°08	45°95
11	44°29	21°87	65°83	18°70	27°95	21°00	42°49	28°04	43°92	38°00	31°45	46°13
12	44°82	21°69	66°58	18°65	28°69	21°17	42°77	28°37	43°62	38°29	30°85	46°31
13	45°36	21°50	67°37	18°60	29°39	21°36	42°98	28°70	43°36	38°55	30°29	46°48
14	45°93	21°30	68°21	18°57	30°02	21°58	43°12	29°02	43°13	38°80	29°75	46°66
15	46°55	21°09	69°06	18°57	30°59	21°81	43°23	29°33	42°93	39°07	29°21	46°86
16	47°23	20°88	69°91	18°58	31°09	22°04	43°35	29°62	42°76	39°34	28°65	47°07
17	47°97	20°68	70°71	18°62	31°56	22°25	43°50	29°88	42°59	39°63	28°04	47°29
18	48°75	20°50	71°46	18°70	32°01	22°45	43°68	30°13	42°40	39°94	27°38	47°52
19	49°53	20°35	72°15	18°79	32°47	22°63	43°88	30°39	42°18	40°26	26°67	47°74
20	50°30	20°22	72°79	18°86	32°96	22°81	44°11	30°65	41°92	40°60	25°92	47°96
21	51°03	20°12	73°41	18°93	33°50	22°99	44°37	30°94	41°60	40°94	25°14	48°17
22	51°71	20°04	74°02	18°98	34°08	23°17	44°62	31°25	41°23	41°27	24°33	48°36
23	52°34	19°96	74°67	19°01	34°68	23°36	44°85	31°57	40°81	41°59	23°50	48°52
24	52°93	19°87	75°36	19°03	35°29	23°56	45°04	31°90	40°35	41°89	22°68	48°66
25	53°51	19°77	76°09	19°04	35°90	23°79	45°17	32°25	39°86	42°18	21°88	48°77
26	54°11	19°65	76°87	19°07	36°49	24°05	45°26	32°61	39°35	42°45	21°13	48°87
27	54°76	19°52	77°68	19°14	37°02	24°31	45°30	32°96	38°87	42°69	20°43	48°96
28	55°46	19°39	78°50	19°22	37°52	24°59	45°28	33°30	38°41	42°92	19°75	49°06
29	56°21	19°26	79°31	19°31	37°97	24°89	45°23	33°63	37°99	43°13	19°07	49°18
30	57°00	19°14	80°10	19°42	38°36	25°18	45°15	33°94	37°60	43°36	18°38	49°31
31	57°83	19°04	80°85	19°56	38°71	25°46	45°06	34°24	37°23	43°61	17°65	49°46
32	58°66	18°97	81°56	19°72			45°00	34°53			16°85	49°62

AT UPPER TRANSIT AT GREENWICH.

31 G Mensæ. Mag. 6.24

Day.	JANUARY.		FEBRUARY.		MARCH.		APRIL.		MAY.		JUNE.	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ^m 05 43	— 84 49	^h ^m 05 43	— 84 49	^h ^m 05 43	— 84 49	^h ^m 05 43	— 84 49	^h ^m 05 43	— 84 49	^h ^m 05 43	— 84 49
1	48°07	26°08	42°61	34°44	35°37	38°43	26°58	38°05	19°07	33°44	13°82	25°25
2	47°94	26°42	42°37	34°60	35°08	38°45	26°33	37°96	18°86	33°27	13°68	24°94
3	47°79	26°74	42°14	34°75	34°81	38°46	26°08	37°88	18°64	33°10	13°56	24°61
4	47°64	27°04	41°91	34°91	34°54	38°50	25°80	37°83	18°41	32°90	13°44	24°26
5	47°49	27°31	41°69	35°09	34°28	38°55	25°53	37°78	18°17	32°67	13°34	23°90
6	47°35	27°57	41°48	35°28	34°01	38°61	25°24	37°72	17°94	32°42	13°26	23°54
7	47°22	27°82	41°26	35°49	33°74	38°68	24°95	37°63	17°73	32°15	13°18	23°20
8	47°10	28°09	41°03	35°71	33°46	38°77	24°66	37°51	17°52	31°88	13°11	22°87
9	46°99	28°38	40°77	35°94	33°17	38°85	24°37	37°38	17°33	31°59	13°06	22°54
10	46°86	28°67	40°51	36°15	32°86	38°92	24°08	37°22	17°14	31°30	13°00	22°22
11	46°72	28°99	40°24	36°34	32°55	38°96	23°82	37°05	16°97	31°02	12°95	21°92
12	46°57	29°33	39°97	36°51	32°25	38°98	23°56	36°87	16°81	30°75	12°89	21°64
13	46°41	29°67	39°69	36°67	31°94	38°97	23°32	36°69	16°66	30°50	12°82	21°37
14	46°23	29°99	39°42	36°80	31°64	38°94	23°08	36°53	16°50	30°26	12°75	21°08
15	46°04	30°29	39°15	36°91	31°35	38°90	22°84	36°37	16°34	30°03	12°67	20°77
16	45°85	30°58	38°89	37°00	31°08	38°85	22°62	36°22	16°17	29°80	12°59	20°45
17	45°65	30°85	38°65	37°09	30°80	38°81	22°39	36°09	16°00	29°57	12°51	20°12
18	45°46	31°08	38°41	37°20	30°53	38°78	22°14	35°96	15°81	29°34	12°45	19°77
19	45°27	31°30	38°16	37°32	30°28	38°76	21°89	35°83	15°63	29°08	12°40	19°39
20	45°10	31°52	37°92	37°44	30°02	38°75	21°65	35°70	15°44	28°79	12°36	19°01
21	44°93	31°75	37°67	37°58	29°75	38°75	21°38	35°56	15°26	28°49	12°35	18°64
22	44°75	31°99	37°41	37°72	29°48	38°75	21°12	35°39	15°10	28°17	12°34	18°29
23	44°58	32°23	37°14	37°87	29°20	38°76	20°85	35°19	14°94	27°83	12°33	17°96
24	44°41	32°48	36°87	38°01	28°90	38°76	20°60	34°98	14°81	27°49	12°33	17°65
25	44°22	32°75	36°57	38°14	28°60	38°73	20°35	34°74	14°69	27°17	12°34	17°37
26	44°02	33°02	36°27	38°25	28°28	38°68	20°12	34°49	14°58	26°86	12°33	17°09
27	43°81	33°29	35°97	38°34	27°98	38°61	19°90	34°25	14°46	26°57	12°30	16°80
28	43°59	33°56	35°67	38°40	27°68	38°52	19°69	34°03	14°34	26°31	12°27	16°50
29	43°35	33°82	35°37	38°43	27°39	38°40	19°49	33°81	14°23	26°05	12°25	16°18
30	43°10	34°05			27°11	38°27	19°28	33°61	14°10	25°79	12°24	15°85
31	42°85	34°26			26°84	38°15	19°07	33°44	13°96	25°53	12°23	15°50
32	42°61	34°44			26°58	38°05			13°82	25°25		

Mean R.A. 05^h 43^m 31^s.770 Mean Dec. —84° 49' 28".94 Sec δ 11.09 Tan δ —11.04

AT UPPER TRANSIT AT GREENWICH.

31 G Mensæ. Mag. 6.24

Day.	JULY.		AUGUST.		SEPTEMBER.		OCTOBER.		NOVEMBER.		DECEMBER.	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ^m 05 43	[°] 84 49	^h ^m 05 43	[°] 84 48	^h ^m 05 43	[°] 84 48	^h ^m 05 43	[°] 84 48	^h ^m 05 43	[°] 84 49	^h ^m 05 43	[°] 84 49
1	12 ^s 23	15 ^s 50	14 ^s 52	66 ^s 01	20 ^s 11	59 ^s 97	26 ^s 94	59 ^s 27	33 ^s 13	04 ^s 21	36 ^s 25	12 ^s 98
2	12 ^s 23	15 ^s 13	14 ^s 67	65 ^s 74	20 ^s 34	59 ^s 90	27 ^s 16	59 ^s 37	33 ^s 27	04 ^s 42	36 ^s 30	13 ^s 27
3	12 ^s 25	14 ^s 76	14 ^s 84	65 ^s 49	20 ^s 57	59 ^s 83	27 ^s 37	59 ^s 47	33 ^s 42	04 ^s 63	36 ^s 35	13 ^s 58
4	12 ^s 29	14 ^s 39	15 ^s 00	65 ^s 25	20 ^s 77	59 ^s 76	27 ^s 56	59 ^s 56	33 ^s 58	04 ^s 83	36 ^s 40	13 ^s 90
5	12 ^s 33	14 ^s 05	15 ^s 16	65 ^s 03	20 ^s 97	59 ^s 69	27 ^s 76	59 ^s 63	33 ^s 75	05 ^s 03	36 ^s 44	14 ^s 25
6	12 ^s 38	13 ^s 72	15 ^s 32	64 ^s 82	21 ^s 17	59 ^s 61	27 ^s 98	59 ^s 69	33 ^s 91	05 ^s 27	36 ^s 48	14 ^s 62
7	12 ^s 44	13 ^s 39	15 ^s 46	64 ^s 63	21 ^s 36	59 ^s 52	28 ^s 20	59 ^s 74	34 ^s 07	05 ^s 54	36 ^s 50	15 ^s 01
8	12 ^s 50	13 ^s 09	15 ^s 61	64 ^s 43	21 ^s 57	59 ^s 42	28 ^s 42	59 ^s 80	34 ^s 23	05 ^s 83	36 ^s 50	15 ^s 40
9	12 ^s 56	12 ^s 81	15 ^s 75	64 ^s 22	21 ^s 78	59 ^s 30	28 ^s 65	59 ^s 88	34 ^s 38	06 ^s 15	36 ^s 48	15 ^s 78
10	12 ^s 61	12 ^s 54	15 ^s 89	63 ^s 99	22 ^s 01	59 ^s 18	28 ^s 89	59 ^s 98	34 ^s 51	06 ^s 48	36 ^s 45	16 ^s 14
11	12 ^s 65	12 ^s 27	16 ^s 02	63 ^s 75	22 ^s 24	59 ^s 08	29 ^s 13	60 ^s 11	34 ^s 62	06 ^s 80	36 ^s 42	16 ^s 49
12	12 ^s 69	11 ^s 98	16 ^s 16	63 ^s 50	22 ^s 49	59 ^s 01	29 ^s 36	60 ^s 27	34 ^s 73	07 ^s 12	36 ^s 39	16 ^s 82
13	12 ^s 73	11 ^s 69	16 ^s 32	63 ^s 23	22 ^s 74	58 ^s 97	29 ^s 58	60 ^s 46	34 ^s 82	07 ^s 42	36 ^s 36	17 ^s 12
14	12 ^s 76	11 ^s 38	16 ^s 49	62 ^s 97	22 ^s 99	58 ^s 94	29 ^s 78	60 ^s 65	34 ^s 92	07 ^s 70	36 ^s 34	17 ^s 41
15	12 ^s 80	11 ^s 04	16 ^s 69	62 ^s 73	23 ^s 23	58 ^s 93	29 ^s 97	60 ^s 84	35 ^s 01	07 ^s 96	36 ^s 33	17 ^s 70
16	12 ^s 85	10 ^s 68	16 ^s 89	62 ^s 50	23 ^s 46	58 ^s 95	30 ^s 15	61 ^s 02	35 ^s 11	08 ^s 22	36 ^s 32	18 ^s 01
17	12 ^s 93	10 ^s 33	17 ^s 09	62 ^s 30	23 ^s 68	58 ^s 98	30 ^s 34	61 ^s 18	35 ^s 22	08 ^s 47	36 ^s 31	18 ^s 34
18	13 ^s 02	09 ^s 98	17 ^s 29	62 ^s 13	23 ^s 89	59 ^s 00	30 ^s 52	61 ^s 32	35 ^s 34	08 ^s 73	{ 36 ^s 29 } { 36 ^s 27 }	{ 18 ^s 68 } { 19 ^s 05 }
19	13 ^s 12	09 ^s 67	17 ^s 48	61 ^s 99	24 ^s 09	59 ^s 00	30 ^s 70	61 ^s 45	35 ^s 46	09 ^s 01	36 ^s 24	19 ^s 43
20	13 ^s 23	09 ^s 36	17 ^s 67	61 ^s 86	24 ^s 30	58 ^s 98	30 ^s 90	61 ^s 58	35 ^s 57	09 ^s 31	36 ^s 20	19 ^s 81
21	13 ^s 34	09 ^s 07	17 ^s 84	61 ^s 72	24 ^s 52	58 ^s 95	31 ^s 11	61 ^s 72	35 ^s 68	09 ^s 63	36 ^s 14	20 ^s 19
22	13 ^s 45	08 ^s 80	18 ^s 02	61 ^s 57	24 ^s 74	58 ^s 92	31 ^s 32	61 ^s 88	35 ^s 78	09 ^s 97	36 ^s 07	20 ^s 57
23	13 ^s 56	08 ^s 56	18 ^s 19	61 ^s 41	24 ^s 98	58 ^s 89	31 ^s 53	62 ^s 06	35 ^s 87	10 ^s 33	35 ^s 98	20 ^s 92
24	13 ^s 65	08 ^s 32	18 ^s 37	61 ^s 23	25 ^s 22	58 ^s 87	31 ^s 75	62 ^s 26	35 ^s 95	10 ^s 69	35 ^s 88	21 ^s 25
25	13 ^s 73	08 ^s 08	18 ^s 55	61 ^s 03	25 ^s 47	58 ^s 86	31 ^s 95	62 ^s 47	36 ^s 02	11 ^s 05	35 ^s 78	21 ^s 58
26	13 ^s 81	07 ^s 82	18 ^s 75	60 ^s 84	25 ^s 72	58 ^s 88	32 ^s 15	62 ^s 71	36 ^s 07	11 ^s 41	35 ^s 68	21 ^s 88
27	13 ^s 91	07 ^s 54	18 ^s 96	60 ^s 65	25 ^s 98	58 ^s 93	32 ^s 34	62 ^s 96	36 ^s 11	11 ^s 76	35 ^s 58	22 ^s 15
28	14 ^s 00	07 ^s 24	19 ^s 18	60 ^s 47	26 ^s 23	58 ^s 99	32 ^s 52	63 ^s 22	36 ^s 14	12 ^s 09	35 ^s 50	22 ^s 42
29	14 ^s 11	06 ^s 93	19 ^s 41	60 ^s 31	26 ^s 47	59 ^s 08	32 ^s 69	63 ^s 48	36 ^s 17	12 ^s 40	35 ^s 43	22 ^s 72
30	14 ^s 23	06 ^s 62	19 ^s 64	60 ^s 17	26 ^s 71	59 ^s 17	32 ^s 84	63 ^s 73	36 ^s 21	12 ^s 69	35 ^s 35	23 ^s 04
31	14 ^s 37	06 ^s 31	19 ^s 88	60 ^s 06	26 ^s 94	59 ^s 27	32 ^s 99	63 ^s 98	36 ^s 25	12 ^s 98	35 ^s 27	23 ^s 38
32	14 ^s 52	06 ^s 01	20 ^s 11	59 ^s 97			33 ^s 13	64 ^s 21			35 ^s 18	23 ^s 73

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

12 B Octantis. Mag. 6.74

Day.	JANUARY.		FEBRUARY.		MARCH.		APRIL.		MAY.		JUNE.	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ₀₅ ^m ₅₈ ^s _—	[°] ₈₅ ['] ₅₅ ["] _—	^h ₀₅ ^m ₅₈ ^s _—	[°] ₈₅ ['] ₅₆ ["] _—	^h ₀₅ ^m ₅₇ ^s _—	[°] ₈₅ ['] ₅₆ ["] _—	^h ₀₅ ^m ₅₇ ^s _—	[°] ₈₅ ['] ₅₆ ["] _—	^h ₀₅ ^m ₅₇ ^s _—	[°] ₈₅ ['] ₅₅ ["] _—	^h ₀₅ ^m ₅₇ ^s _—	[°] ₈₅ ['] ₅₅ ["] _—
1	22.22	54.15	15.67	02.92	66.63	07.51	55.41	07.88	45.56	63.97	38.33	56.33
2	22.06	54.49	15.37	03.11	66.27	07.56	55.07	07.82	45.27	63.82	38.14	56.03
3	21.89	54.81	15.08	03.28	65.92	07.60	54.73	07.78	44.97	63.67	37.95	55.72
4	21.71	55.11	14.80	03.44	65.58	07.65	54.39	07.76	44.66	63.50	37.78	55.39
5	21.53	55.39	14.54	03.63	65.25	07.72	54.04	07.73	44.35	63.30	37.63	55.05
6	21.37	55.66	14.28	03.84	64.92	07.80	53.67	07.69	44.04	63.07	37.49	54.71
7	21.22	55.92	14.01	04.06	64.58	07.90	53.29	07.62	43.74	62.83	37.37	54.37
8	21.08	56.20	13.72	04.30	64.23	08.01	52.91	07.54	43.46	62.58	37.26	54.04
9	20.94	56.50	13.42	04.55	63.86	08.11	52.53	07.43	43.19	62.31	37.16	53.71
10	20.80	56.82	13.09	04.78	63.47	08.20	52.16	07.30	42.94	62.04	37.07	53.41
11	20.65	57.15	12.76	05.00	63.08	08.27	51.82	07.15	42.72	61.77	36.99	53.13
12	20.48	57.50	12.41	05.19	62.68	08.31	51.48	07.00	42.50	61.51	36.90	52.85
13	20.29	57.86	12.06	05.37	62.30	08.33	51.16	06.84	42.28	61.27	36.79	52.58
14	20.07	58.20	11.72	05.53	61.91	08.33	50.85	06.70	42.06	61.05	36.68	52.31
15	19.85	58.52	11.39	05.66	61.54	08.31	50.54	06.56	41.84	60.83	36.56	52.03
16	19.62	58.82	11.06	05.78	61.18	08.29	50.23	06.43	41.61	60.62	36.44	51.72
17	19.38	59.09	10.75	05.90	60.84	08.28	49.93	06.32	41.38	60.41	36.32	51.39
18	19.14	59.33	10.44	06.03	60.50	08.27	49.62	06.22	41.14	60.19	36.21	51.05
19	18.91	59.57	10.14	06.16	60.16	08.27	49.30	06.11	40.88	59.95	36.12	50.68
20	18.70	59.81	09.84	06.30	59.83	08.28	48.97	06.00	40.62	59.70	36.05	50.31
21	18.49	60.05	09.53	06.46	59.49	08.30	48.63	05.89	40.37	59.43	36.00	49.94
22	18.28	60.29	09.21	06.63	59.14	08.33	48.28	05.75	40.14	59.12	35.97	49.58
23	18.08	60.54	08.88	06.80	58.78	08.37	47.92	05.58	39.92	58.79	35.95	49.26
24	17.87	60.82	08.53	06.96	58.40	08.39	47.57	05.38	39.73	58.46	35.93	48.96
25	17.64	61.10	08.17	07.12	58.00	08.39	47.24	05.16	39.55	58.16	35.91	48.67
26	17.41	61.39	07.79	07.25	57.61	08.37	46.93	04.93	39.39	57.86	35.87	48.39
27	17.16	61.69	07.40	07.36	57.22	08.32	46.64	04.72	39.23	57.57	35.83	48.11
28	16.89	61.97	07.02	07.44	56.82	08.25	46.37	04.51	39.06	57.32	35.77	47.82
29	16.60	62.24	06.63	07.51	56.44	08.16	46.10	04.31	38.89	57.09	35.71	47.51
30	16.29	62.49			56.08	08.06	45.83	04.13	38.72	56.85	35.66	47.19
31	15.98	62.72			55.74	07.96	45.56	03.97	38.53	56.60	35.63	46.84
32	15.67	62.92			55.41	07.88			38.33	56.33		

Mean R.A. 05^h 58^m 01.^s 626 Mean Dec. -85° 55' 58".43 Sec δ 14.10 Tan δ -14.06

AT UPPER TRANSIT AT GREENWICH.

12 B Octantis. Mag. 6.74

Day.	JULY.		AUGUST.		SEPTEMBER.		OCTOBER.		NOVEMBER.		DECEMBER.	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ^m ^s [°] [']	^h ^m ^s [°] [']	^h ^m ^s [°] [']	^h ^m ^s [°] [']	^h ^m ^s [°] [']	^h ^m ^s [°] [']	^h ^m ^s [°] [']	^h ^m ^s [°] [']	^h ^m ^s [°] [']	^h ^m ^s [°] [']	^h ^m ^s [°] [']	^h ^m ^s [°] [']
	05 57 85 55	05 57 85 55	05 57 85 55	05 57 85 55	05 57 85 55	05 57 85 55	05 57 85 55	05 57 85 55	05 58 85 55	05 58 85 55	05 58 85 55	05 58 85 55
1	35 ^s 63	46 ⁿ 84	37 ^s 92	37 ⁿ 26	44 ^s 60	30 ⁿ 83	53 ^s 17	29 ⁿ 57	01 ^s 23	33 ⁿ 99	05 ^s 61	42 ⁿ 45
2	35 ^s 62	46 ⁿ 47	38 ^s 10	36 ⁿ 97	44 ^s 88	30 ⁿ 74	53 ^s 45	29 ⁿ 66	01 ^s 42	34 ⁿ 19	05 ^s 68	42 ⁿ 73
3	35 ^s 62	46 ⁿ 10	38 ^s 29	36 ⁿ 71	45 ^s 16	30 ⁿ 66	53 ^s 71	29 ⁿ 74	01 ^s 62	34 ⁿ 37	05 ^s 76	43 ⁿ 04
4	35 ^s 64	45 ⁿ 74	38 ^s 48	36 ⁿ 46	45 ^s 42	30 ⁿ 58	53 ^s 97	29 ⁿ 80	01 ^s 83	34 ⁿ 55	05 ^s 84	43 ⁿ 36
5	35 ^s 67	45 ⁿ 38	38 ^s 67	36 ⁿ 22	45 ^s 67	30 ⁿ 49	54 ^s 23	29 ⁿ 86	02 ^s 05	34 ⁿ 75	05 ^s 92	43 ⁿ 71
6	35 ^s 72	45 ⁿ 04	38 ^s 86	36 ⁿ 00	45 ^s 92	30 ⁿ 40	54 ^s 50	29 ⁿ 90	02 ^s 28	34 ⁿ 98	05 ^s 98	44 ⁿ 07
7	35 ^s 78	44 ⁿ 72	39 ^s 04	35 ⁿ 79	46 ^s 16	30 ⁿ 29	54 ^s 77	29 ⁿ 94	02 ^s 50	35 ⁿ 24	06 ^s 03	44 ⁿ 45
8	35 ^s 84	44 ⁿ 43	39 ^s 21	35 ⁿ 58	46 ^s 40	30 ⁿ 17	55 ^s 05	29 ⁿ 98	02 ^s 72	35 ⁿ 52	06 ^s 05	44 ⁿ 84
9	35 ^s 89	44 ⁿ 16	39 ^s 36	35 ⁿ 37	46 ^s 66	30 ⁿ 03	55 ^s 36	30 ⁿ 03	02 ^s 93	35 ⁿ 82	06 ^s 05	45 ⁿ 22
10	35 ^s 94	43 ⁿ 88	39 ^s 51	35 ⁿ 14	46 ^s 94	29 ⁿ 90	55 ^s 67	30 ⁿ 12	03 ^s 11	36 ⁿ 13	06 ^s 02	45 ⁿ 58
11	35 ^s 97	43 ⁿ 60	39 ^s 67	34 ⁿ 90	47 ^s 23	29 ⁿ 77	55 ^s 98	30 ⁿ 24	03 ^s 27	36 ⁿ 45	05 ^s 99	45 ⁿ 93
12	36 ^s 00	43 ⁿ 32	39 ^s 83	34 ⁿ 63	47 ^s 54	29 ⁿ 66	56 ^s 28	30 ⁿ 39	03 ^s 41	36 ⁿ 75	05 ^s 97	46 ⁿ 25
13	36 ^s 02	43 ⁿ 02	40 ^s 02	34 ⁿ 35	47 ^s 85	29 ⁿ 58	56 ^s 57	30 ⁿ 55	03 ^s 54	37 ⁿ 04	05 ^s 95	46 ⁿ 55
14	36 ^s 04	42 ⁿ 71	40 ^s 23	34 ⁿ 08	48 ^s 17	29 ⁿ 55	56 ^s 83	30 ⁿ 73	03 ^s 66	37 ⁿ 30	05 ^s 94	46 ⁿ 85
15	36 ^s 07	42 ⁿ 39	40 ^s 45	33 ⁿ 82	48 ^s 47	29 ⁿ 54	57 ^s 08	30 ⁿ 90	03 ^s 80	37 ⁿ 55	05 ^s 93	47 ⁿ 15
16	36 ^s 12	42 ⁿ 04	40 ^s 69	33 ⁿ 59	48 ^s 76	29 ⁿ 54	57 ^s 32	31 ⁿ 06	03 ^s 94	37 ⁿ 80	05 ^s 93	47 ⁿ 45
17	36 ^s 18	41 ⁿ 68	40 ^s 93	33 ⁿ 38	49 ^s 04	29 ⁿ 55	57 ^s 55	31 ⁿ 21	04 ^s 08	38 ⁿ 06	05 ^s 93	47 ⁿ 78
18	36 ^s 27	41 ⁿ 33	41 ^s 18	33 ⁿ 19	49 ^s 31	29 ⁿ 55	57 ^s 78	31 ⁿ 35	04 ^s 24	38 ⁿ 31	05 ^s 94	48 ⁿ 12
19	36 ^s 38	40 ⁿ 99	41 ^s 41	33 ⁿ 04	49 ^s 57	29 ⁿ 53	58 ^s 02	31 ⁿ 46	04 ^s 41	38 ⁿ 58	05 ^s 93	48 ⁿ 49
20	36 ^s 50	40 ⁿ 68	41 ^s 64	32 ⁿ 89	49 ^s 82	29 ⁿ 50	58 ^s 28	31 ⁿ 57	04 ^s 57	38 ⁿ 87	05 ^s 92	48 ⁿ 86
21	36 ^s 62	40 ⁿ 39	41 ^s 86	32 ⁿ 75	50 ^s 08	29 ⁿ 46	58 ^s 55	31 ⁿ 69	04 ^s 73	39 ⁿ 18	{ 05 ^s 88 } { 05 ^s 81 }	{ 49 ⁿ 24 } { 49 ⁿ 62 }
22	36 ^s 75	40 ⁿ 12	42 ^s 06	32 ⁿ 58	50 ^s 36	29 ⁿ 41	58 ^s 83	31 ⁿ 83	04 ^s 88	39 ⁿ 50	05 ^s 72	50 ⁿ 01
23	36 ^s 87	39 ⁿ 88	42 ^s 25	32 ⁿ 41	50 ^s 65	29 ⁿ 37	59 ^s 11	31 ⁿ 99	05 ^s 01	39 ⁿ 84	05 ^s 63	50 ⁿ 38
24	36 ^s 97	39 ⁿ 64	42 ^s 46	32 ⁿ 23	50 ^s 97	29 ⁿ 33	59 ^s 39	32 ⁿ 16	05 ^s 13	40 ⁿ 20	05 ^s 54	50 ⁿ 73
25	37 ^s 06	39 ⁿ 39	42 ^s 68	32 ⁿ 03	51 ^s 29	29 ⁿ 30	59 ^s 66	32 ⁿ 35	05 ^s 23	40 ⁿ 56	05 ^s 43	51 ⁿ 06
26	37 ^s 15	39 ⁿ 13	42 ^s 93	31 ⁿ 82	51 ^s 61	29 ⁿ 29	59 ^s 93	32 ⁿ 57	05 ^s 31	40 ⁿ 92	05 ^s 31	51 ⁿ 36
27	37 ^s 24	38 ⁿ 85	43 ^s 18	31 ⁿ 62	51 ^s 94	29 ⁿ 31	60 ^s 19	32 ⁿ 81	05 ^s 38	41 ⁿ 25	05 ^s 21	51 ⁿ 64
28	37 ^s 34	38 ⁿ 54	43 ^s 45	31 ⁿ 42	52 ^s 26	29 ⁿ 35	60 ^s 42	33 ⁿ 06	05 ^s 44	41 ⁿ 57	05 ^s 11	51 ⁿ 93
29	37 ^s 45	38 ⁿ 21	43 ^s 73	31 ⁿ 24	52 ^s 57	29 ⁿ 42	60 ^s 64	33 ⁿ 30	05 ^s 49	41 ⁿ 88	05 ^s 02	52 ⁿ 22
30	37 ^s 59	37 ⁿ 88	44 ^s 02	31 ⁿ 08	52 ^s 88	29 ⁿ 49	60 ^s 85	33 ⁿ 54	05 ^s 55	42 ⁿ 17	04 ^s 94	52 ⁿ 54
31	37 ^s 75	37 ⁿ 56	44 ^s 31	30 ⁿ 95	53 ^s 17	29 ⁿ 57	61 ^s 04	33 ⁿ 77	05 ^s 61	42 ⁿ 45	04 ^s 86	52 ⁿ 87
32	37 ^s 92	37 ⁿ 26	44 ^s 60	30 ⁿ 83			61 ^s 23	33 ⁿ 99			04 ^s 77	53 ⁿ 21

AT UPPER TRANSIT AT GREENWICH.

A Octantis. Mag. 7.75

Day.	JANUARY.		FEBRUARY.		MARCH.		APRIL.		MAY.		JUNE.	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ^m ^s 07 29 88 38	—	^h ^m ^s 07 29 88 38	—	^h ^m ^s 07 28 88 38	—	^h ^m ^s 07 28 88 39	—	^h ^m ^s 07 27 88 38	—	^h ^m ^s 07 27 88 38	—
1	43°56	36°70	34°01	47°92	73°40	55°87	42°29	00°90	70°41	61°46	41°68	57°60
2	43°52	37°10	33°34	48°20	72°43	56°07	41°32	00°98	69°43	61°46	40°79	57°41
3	43°41	37°49	32°71	48°47	71°50	56°25	40°35	01°08	68°41	61°45	39°91	57°21
4	43°24	37°86	32°12	48°74	70°61	56°44	39°36	01°19	67°35	61°43	39°05	56°98
5	43°03	38°21	31°59	49°03	69°77	56°64	38°32	01°31	66°24	61°38	38°25	56°73
6	42°80	38°55	31°08	49°34	68°94	56°85	37°22	01°43	65°12	61°31	37°50	56°48
7	42°61	38°87	30°56	49°66	68°11	57°08	36°08	01°53	64°00	61°22	36°80	56°23
8	42°45	39°17	30°02	50°00	67°23	57°33	34°90	01°61	62°92	61°11	36°16	55°98
9	42°33	39°48	29°42	50°35	66°29	57°59	33°70	01°67	61°89	60°98	35°57	55°73
10	42°26	39°81	28°76	50°70	65°30	57°83	32°53	01°71	60°91	60°84	34°99	55°50
11	42°21	40°16	28°04	51°04	64°26	58°05	31°37	01°73	59°97	60°69	34°43	55°28
12	42°14	40°53	27°26	51°36	63°18	58°25	30°26	01°73	59°08	60°55	33°87	55°08
13	{42°02} {41°83}	{40°92} {41°32}	26°45	51°66	62°09	58°44	29°19	01°73	58°22	60°41	33°28	54°87
14	41°56	41°73	25°64	51°94	61°01	58°61	28°17	01°72	57°37	60°29	32°66	54°67
15	41°23	42°11	24°84	52°20	59°95	58°75	27°17	01°72	56°53	60°19	31°99	54°46
16	40°86	42°47	24°05	52°44	58°93	58°88	26°20	01°73	55°67	60°10	31°29	54°24
17	40°46	42°82	23°29	52°68	57°96	59°00	25°24	01°75	54°78	60°01	30°58	54°00
18	40°06	43°15	22°57	52°92	57°01	59°13	24°26	01°79	53°84	59°91	29°87	53°74
19	39°67	43°46	21°87	53°17	56°09	59°26	23°25	01°84	52°86	59°80	29°19	53°44
20	39°29	43°77	21°19	53°43	55°17	59°41	22°21	01°88	51°84	59°68	28°58	53°13
21	38°95	44°08	20°50	53°70	54°25	59°57	21°10	01°92	50°81	59°53	28°05	52°82
22	38°63	44°39	19°79	53°98	53°31	59°75	19°94	01°93	49°80	59°36	27°61	52°52
23	38°32	44°71	19°04	54°27	52°32	59°93	18°75	01°93	48°83	59°16	27°21	52°24
24	38°03	45°06	18°24	54°58	51°27	60°10	17°56	01°90	47°93	58°94	26°84	51°98
25	37°72	45°41	17°37	54°89	50°17	60°27	16°39	01°85	47°10	58°73	26°46	51°75
26	37°37	45°77	16°43	55°17	49°01	60°41	15°27	01°77	46°34	58°54	26°05	51°52
27	36°98	46°15	15°44	55°42	47°82	60°53	14°21	01°69	45°61	58°36	25°60	51°29
28	36°51	46°53	14°42	55°65	46°63	60°63	13°21	01°62	44°89	58°19	25°11	51°05
29	35°97	46°91	13°40	55°87	45°47	60°71	12°27	01°55	44°15	58°04	24°59	50°78
30	35°35	47°27			44°36	60°77	11°35	01°50	43°37	57°90	24°08	50°51
31	34°69	47°60			43°30	60°83	10°41	01°46	42°55	57°76	23°59	50°22
32	34°01	47°92			42°29	60°90			41°68	57°60		

Mean R.A. 07^h 28^m 50^s.716 Mean Dec. —88° 38' 49".71 Sec δ 42.36 Tan δ —42.34

AT UPPER TRANSIT AT GREENWICH.

A Octantis. Mag. 7.75

Day.	JULY.		AUGUST.		SEPTEMBER.		OCTOBER.		NOVEMBER.		DECEMBER.	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ^m ^s 07 27 88 38	—	^h ^m ^s 07 27 88 38	—	^h ^m ^s 07 27 88 38	—	^h ^m ^s 07 27 88 38	—	^h ^m ^s 07 28 88 38	—	^h ^m ^s 07 28 88 38	—
1	23°59	50°22	19°33	40°71	30°75	32°26	52°83	27°71	19°30	28°51	39°71	34°58
2	23°13	49°91	19°53	40°38	31°43	32°06	53°67	27°68	20°00	28°62	40°20	34°81
3	22°73	49°58	19°77	40°06	32°09	31°87	54°46	27°66	20°72	28°73	40°74	35°04
4	22°40	49°25	20°04	39°76	32°73	31°69	55°21	27°62	21°48	28°83	41°30	35°31
5	22°12	48°92	20°33	39°47	33°32	31°52	55°95	27°56	22°29	28°93	41°88	35°60
6	21°90	48°59	20°62	39°20	33°87	31°34	56°69	27°49	23°15	29°04	42°45	35°91
7	21°71	48°28	20°88	38°94	34°39	31°15	57°48	27°42	24°04	29°19	42°95	36°25
8	21°54	47°99	21°10	38°69	34°91	30°95	58°32	27°34	24°93	29°36	43°37	36°60
9	21°38	47°71	21°28	38°43	35°46	30°73	59°22	27°27	25°80	29°55	43°73	36°96
10	21°21	47°44	21°43	38°16	36°07	30°50	60°17	27°23	26°61	29°76	44°02	37°31
11	21°01	47°18	21°57	37°87	36°75	30°27	61°14	27°21	27°36	29°98	44°25	37°63
12	20°76	46°92	21°72	37°56	37°49	30°05	62°11	27°21	28°04	30°21	44°48	37°93
13	20°48	46°65	21°91	37°24	38°29	29°86	63°07	27°23	28°67	30°42	44°71	38°22
14	20°18	46°37	22°18	36°91	39°12	29°70	63°98	27°28	29°27	30°61	44°98	38°50
15	19°88	46°07	22°53	36°59	39°95	29°56	64°83	27°35	29°87	30°80	45°27	38°78
16	19°61	45°74	22°96	36°28	40°75	29°44	65°62	27°42	30°49	30°97	45°59	39°07
17	19°39	45°39	23°43	36°00	41°50	29°34	66°38	27°47	31°16	31°14	45°94	39°37
18	19°25	45°03	23°91	35°74	42°21	29°23	67°13	27°50	31°86	31°31	46°30	39°68
19	19°19	44°68	24°39	35°51	42°88	29°12	67°91	27°50	32°59	31°49	46°65	40°01
20	19°20	44°35	24°85	35°29	43°53	28°99	68°73	27°50	33°34	31°69	46°97	40°35
21	19°25	44°04	25°26	35°07	44°20	28°85	69°59	27°50	34°10	31°91	47°25	40°72
22	19°30	43°75	25°63	34°85	44°91	28°69	70°50	27°51	34°86	32°14	47°48	41°09
23	19°34	43°47	25°98	34°61	45°66	28°53	71°43	27°54	35°58	32°40	47°64	41°47
24	19°35	43°21	26°33	34°35	46°46	28°37	72°39	27°59	36°26	32°68	47°74	41°85
25	19°32	42°96	26°70	34°08	47°32	28°22	73°37	27°66	36°89	32°97	47°77	42°22
26	19°25	42°68	27°12	33°80	48°22	28°08	74°34	27°75	37°46	33°26	47°76	42°57
27	19°16	42°38	27°61	33°52	49°15	27°97	75°28	27°87	37°96	33°55	47°73	42°90
28	19°09	42°06	28°15	33°24	50°09	27°87	76°19	27°99	38°41	33°82	47°70	43°22
29	19°06	41°73	28°74	32°96	51°03	27°80	77°04	28°12	38°84	34°09	47°72	43°52
30	19°09	41°39	29°38	32°70	51°95	27°75	77°84	28°26	39°26	34°34	47°78	43°82
31	19°18	41°05	30°05	32°47	52°83	27°71	78°59	28°39	39°71	34°58	47°88	44°14
32	19°33	40°71	30°75	32°26			79°30	28°51			48°00	44°49

AT UPPER TRANSIT AT GREENWICH.

10 G Octantis. Mag. 6.74

Day.	JANUARY.		FEBRUARY.		MARCH.		APRIL.		MAY.		JUNE.	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ₁₀ ^m ₃₅ ^s ₈₅ [°] ₄₃	^h ₁₀ ^m ₃₅ ^s ₈₅ [°] ₄₃	^h ₁₀ ^m ₃₅ ^s ₈₅ [°] ₄₃	^h ₁₀ ^m ₃₅ ^s ₈₅ [°] ₄₃	^h ₁₀ ^m ₃₅ ^s ₈₅ [°] ₄₃	^h ₁₀ ^m ₃₅ ^s ₈₅ [°] ₄₃	^h ₁₀ ^m ₃₅ ^s ₈₅ [°] ₄₄	^h ₁₀ ^m ₃₅ ^s ₈₅ [°] ₄₄	^h ₁₀ ^m ₃₅ ^s ₈₅ [°] ₄₄	^h ₁₀ ^m ₃₄ ^s ₈₅ [°] ₄₄	^h ₁₀ ^m ₃₄ ^s ₈₅ [°] ₄₄	^h ₁₀ ^m ₃₄ ^s ₈₅ [°] ₄₄
1	18 ^s .26	38 ^s .56	23 ^s .58	48 ^s .65	24 ^s .54	59 ^s .57	21 ^s .10	11 ^s .45	14 ^s .74	19 ^s .98	66 ^s .28	24 ^s .60
2	18.52	38.85	23.65	49.04	{24.43}	{59.97}	20.94	11.75	14.53	20.21	65.98	24.70
3	18.76	39.16	23.71	49.42	24.29	60.72	20.80	12.07	14.31	20.45	65.66	24.78
4	18.98	39.47	23.75	49.79	24.22	61.08	20.66	12.41	14.07	20.71	65.35	24.84
5	19.17	39.77	23.79	50.14	24.17	61.43	20.52	12.77	13.81	20.96	65.02	24.87
6	19.34	40.07	23.86	50.48	24.13	61.80	20.38	13.14	13.53	21.20	64.70	24.87
7	19.51	40.35	23.95	50.82	24.11	62.18	20.20	13.50	13.24	21.42	64.39	24.86
8	19.67	40.61	24.05	51.18	24.08	62.57	20.01	13.85	12.94	21.61	64.09	24.84
9	19.86	40.86	24.15	51.57	24.05	62.99	19.80	14.18	12.63	21.78	63.81	24.82
10	20.06	41.12	24.25	51.96	23.99	63.42	19.57	14.50	12.33	21.93	63.54	24.80
11	20.28	41.38	24.35	52.38	23.92	63.85	19.33	14.80	12.04	22.07	63.28	24.80
12	20.50	41.67	24.42	52.81	23.83	64.28	19.10	15.09	11.77	22.20	63.03	24.80
13	20.73	41.98	24.47	53.24	23.72	64.68	18.86	15.36	11.51	22.33	62.78	24.81
14	20.96	42.32	24.50	53.67	23.59	65.06	18.64	15.62	11.26	22.46	62.53	24.83
15	21.17	42.67	24.51	54.07	23.45	65.43	18.43	15.87	11.01	22.61	62.26	24.86
16	21.36	43.03	24.50	54.46	23.32	65.78	18.23	16.12	10.77	22.76	61.98	24.88
17	21.53	43.40	24.50	54.83	23.20	66.11	18.04	16.39	10.53	22.93	61.68	24.90
18	21.68	43.75	24.49	55.19	23.08	66.44	17.85	16.66	10.27	23.11	61.36	24.89
19	21.81	44.09	24.49	55.54	22.97	66.77	17.67	16.95	10.00	23.29	61.04	24.86
20	21.93	44.42	24.50	55.89	22.87	67.11	17.48	17.26	09.70	23.46	60.72	24.80
21	22.06	44.74	24.52	56.25	22.78	67.46	17.27	17.57	09.40	23.61	60.41	24.72
22	22.18	45.05	24.54	56.62	22.69	67.83	17.04	17.89	09.08	23.74	60.13	24.62
23	22.31	45.35	24.58	57.01	22.60	68.21	16.80	18.19	08.75	23.84	59.87	24.52
24	22.46	45.66	24.61	57.42	22.49	68.60	16.53	18.45	08.43	23.92	59.63	24.44
25	22.61	45.97	24.63	57.83	22.36	69.01	16.25	18.70	08.12	23.99	59.40	24.38
26	22.77	46.30	24.64	58.26	22.22	69.41	15.96	18.93	07.84	24.05	59.18	24.33
27	22.94	46.64	24.63	58.70	22.05	69.80	15.68	19.15	07.56	24.11	58.95	24.29
28	23.10	47.01	24.60	59.14	21.86	70.17	15.42	19.35	07.30	24.19	58.69	24.26
29	23.25	47.40	24.54	59.57	21.66	70.52	15.18	19.54	07.05	24.28	58.42	24.21
30	23.39	47.82			21.46	70.84	14.95	19.75	06.80	24.37	58.14	24.14
31	23.50	48.24			21.27	71.15	14.74	19.98	06.55	24.48	57.85	24.05
32	23.58	48.65			21.10	71.45			06.28	24.60		

Mean R.A. 10^h 35^m 15^s.389 Mean Dec. -85° 44' 01".01 Sec δ 13.44 Tan δ -13.40

AT UPPER TRANSIT AT GREENWICH.

10 G Octantis. Mag. 6.74

Day.	JULY.		AUGUST.		SEPTEMBER.		OCTOBER.		NOVEMBER.		DECEMBER.	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ^m ^s 10 34 85 44	—	^h ^m ^s 10 34 85 44	—	^h ^m ^s 10 34 85 44	—	^h ^m ^s 10 34 85 43	—	^h ^m ^s 10 34 85 43	—	^h ^m ^s 10 35 85 43	—
1	57.85	24.05	51.04	18.51	48.25	09.71	50.30	60.96	56.80	54.86	05.39	54.03
2	57.56	23.94	50.87	18.23	48.27	09.40	50.47	60.74	57.02	54.76	05.65	54.07
3	57.27	23.81	50.72	17.95	48.30	09.11	50.63	60.51	57.25	54.65	05.92	54.11
4	56.99	23.66	50.59	17.67	48.33	08.83	50.77	60.28	57.49	54.52	06.22	54.16
5	56.72	23.50	50.47	17.40	48.36	08.57	50.91	60.05	57.73	54.38	06.54	54.22
6	56.47	23.34	50.37	17.14	48.37	08.31	51.04	59.81	57.99	54.25	06.87	54.31
7	56.23	23.18	50.27	16.90	48.36	08.05	51.17	59.55	58.28	54.12	07.21	54.42
8	56.00	23.01	50.16	16.67	48.35	07.77	51.30	59.28	58.59	54.02	07.55	54.56
9	55.80	22.86	50.04	16.45	48.34	07.47	51.46	59.01	58.92	53.94	07.86	54.73
10	55.60	22.71	49.91	16.23	48.33	07.15	51.64	58.73	59.24	53.89	08.16	54.90
11	55.40	22.59	49.77	16.00	48.33	06.81	51.84	58.47	59.56	53.86	08.44	55.08
12	55.19	22.48	49.62	15.74	48.36	06.46	52.06	58.23	59.86	53.85	08.70	55.24
13	54.97	22.37	49.46	15.46	48.42	06.12	52.29	58.02	60.15	53.85	08.95	55.38
14	54.73	22.24	49.31	15.16	48.49	05.80	52.53	57.85	60.42	53.85	09.19	55.52
15	54.47	22.09	49.18	14.84	48.59	05.50	52.76	57.68	60.68	53.82	09.44	55.65
16	54.21	21.93	49.07	14.52	48.69	05.21	52.98	57.52	60.93	53.78	09.70	55.78
17	53.95	21.74	48.99	14.20	48.80	04.95	53.18	57.36	61.20	53.73	09.97	55.90
18	53.69	21.53	48.94	13.91	48.89	04.71	53.38	57.18	61.46	53.68	10.26	56.04
19	53.46	21.30	48.90	13.63	48.97	04.47	53.57	57.00	61.75	53.63	10.57	56.20
20	53.25	21.07	48.86	13.36	49.05	04.21	53.76	56.80	62.05	53.58	10.87	56.37
21	53.07	20.85	48.81	13.10	49.11	03.93	53.96	56.58	62.36	53.54	11.18	56.56
22	52.91	20.64	48.76	12.85	49.16	03.64	54.16	56.36	62.68	53.52	11.48	56.78
23	52.75	20.44	48.70	12.58	49.23	03.33	54.38	56.13	63.01	53.52	11.77	57.02
24	52.59	20.26	48.62	12.32	49.30	03.01	54.63	55.92	63.35	53.55	12.04	57.27
25	52.43	20.09	48.53	12.04	49.39	02.69	54.89	55.73	63.68	53.61	12.30	57.52
26	52.25	19.92	48.44	11.73	49.51	02.37	55.16	55.56	64.00	53.67	12.54	57.76
27	52.05	19.74	48.36	11.41	49.64	02.05	55.45	55.40	64.31	53.75	12.75	58.00
28	51.84	19.54	48.31	11.07	49.79	01.75	55.73	55.26	64.60	53.84	12.95	58.22
29	51.63	19.31	48.27	10.72	49.95	01.47	56.02	55.14	64.87	53.91	13.16	58.44
30	51.43	19.06	48.24	10.37	50.12	01.20	56.30	55.05	65.13	53.97	13.38	58.64
31	51.23	18.79	48.24	10.03	50.30	00.96	56.56	54.96	65.39	54.03	13.62	58.85
32	51.04	18.51	48.25	09.71			56.80	54.86			13.87	59.07

Catalogue Number 649

Spectrum Ao

AT UPPER TRANSIT AT GREENWICH.

 η Octantis. Mag. 6.26

Day.	JANUARY.		FEBRUARY.		MARCH.		APRIL.		MAY.		JUNE.	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ₁₀ ^m ₅₉ ^s ₈₄ [°] ₁₂	^h ₁₀ ^m ₅₉ ^s ₈₄ [°] ₁₃	^h ₁₀ ^m ₅₉ ^s ₈₄ [°] ₁₃	^h ₁₀ ^m ₅₉ ^s ₈₄ [°] ₁₃	^h ₁₀ ^m ₅₉ ^s ₈₄ [°] ₁₃	^h ₁₀ ^m ₅₉ ^s ₈₄ [°] ₁₃	^h ₁₀ ^m ₅₉ ^s ₈₄ [°] ₁₃	^h ₁₀ ^m ₅₉ ^s ₈₄ [°] ₁₃	^h ₁₀ ^m ₅₉ ^s ₈₄ [°] ₁₃	^h ₁₀ ^m ₅₉ ^s ₈₄ [°] ₁₃	^h ₁₀ ^m ₅₉ ^s ₈₄ [°] ₁₃	^h ₁₀ ^m ₅₉ ^s ₈₄ [°] ₁₃
1	50 ^s .99	59 ["] .14	55 ^s .70	08 ["] .66	57 ^s .22	19 ["] .49	55 ^s .60	31 ["] .72	51 ^s .59	40 ["] .89	45 ^s .79	46 ["] .46
2	51 ^s .20	59 ["] .40	55 ^s .77	09 ["] .05	57 ^s .20	19 ["] .90	55 ^s .50	32 ["] .04	51 ^s .45	41 ["] .15	45 ^s .59	46 ["] .59
3	51 ^s .41	59 ["] .68	55 ^s .84	09 ["] .43	57 ^s .16	20 ["] .28	55 ^s .42	32 ["] .38	51 ^s .31	41 ["] .44	45 ^s .37	46 ["] .70
4	51 ^s .60	59 ["] .97	55 ^s .90	09 ["] .79	57 ^s .13	20 ["] .66	55 ^s .35	32 ["] .74	51 ^s .15	41 ["] .73	45 ^s .15	46 ["] .79
5	51 ^s .76	60 ["] .25	55 ^s .96	10 ["] .13	57 ^s .10	21 ["] .03	55 ^s .27	33 ["] .11	50 ^s .99	42 ["] .01	44 ^s .91	46 ["] .85
6	51 ^s .91	60 ["] .53	56 ^s .04	10 ["] .46	57 ^s .09	21 ["] .39	55 ^s .19	33 ["] .49	50 ^s .81	42 ["] .27	44 ^s .68	46 ["] .90
7	52 ^s .06	60 ["] .79	56 ^s .13	10 ["] .79	57 ^s .08	21 ["] .75	55 ^s .10	33 ["] .87	50 ^s .61	42 ["] .51	44 ^s .45	46 ["] .93
8	52 ^s .21	61 ["] .04	56 ^s .23	11 ["] .14	{ 57 ^s .09 }	{ 22 ["] .14 }	54 ^s .98	34 ["] .25	50 ^s .41	42 ["] .74	44 ^s .24	46 ["] .95
9	52 ^s .37	61 ["] .27	56 ^s .34	11 ["] .51	57 ^s .11	22 ["] .97	54 ^s .84	34 ["] .62	50 ^s .20	42 ["] .95	44 ^s .03	46 ["] .96
10	52 ^s .53	61 ["] .50	56 ^s .44	11 ["] .91	57 ^s .12	23 ["] .41	54 ^s .70	34 ["] .96	49 ^s .99	43 ["] .13	43 ^s .83	46 ["] .98
11	52 ^s .71	61 ["] .74	56 ^s .54	12 ["] .33	57 ^s .10	23 ["] .84	54 ^s .56	35 ["] .28	49 ^s .79	43 ["] .30	43 ^s .65	47 ["] .00
12	52 ^s .90	62 ["] .01	56 ^s .63	12 ["] .75	57 ^s .06	24 ["] .27	54 ^s .41	35 ["] .59	49 ^s .59	43 ["] .46	43 ^s .46	47 ["] .03
13	53 ^s .09	62 ["] .30	56 ^s .70	13 ["] .16	57 ^s .00	24 ["] .68	54 ^s .26	35 ["] .88	49 ^s .41	43 ["] .61	43 ^s .29	47 ["] .07
14	53 ^s .28	62 ["] .61	56 ^s .75	13 ["] .57	56 ^s .94	25 ["] .09	54 ^s .11	36 ["] .16	49 ^s .23	43 ["] .77	43 ^s .11	47 ["] .12
15	53 ^s .47	62 ["] .95	56 ^s .79	13 ["] .98	56 ^s .87	25 ["] .47	53 ^s .98	36 ["] .43	49 ^s .06	43 ["] .94	42 ^s .92	47 ["] .18
16	53 ^s .63	63 ["] .29	56 ^s .82	14 ["] .38	56 ^s .80	25 ["] .84	53 ^s .84	36 ["] .70	48 ^s .90	44 ["] .13	42 ^s .72	47 ["] .23
17	53 ^s .78	63 ["] .63	56 ^s .84	14 ["] .76	56 ^s .73	26 ["] .19	53 ^s .72	36 ["] .98	48 ^s .74	44 ["] .32	42 ^s .50	47 ["] .28
18	53 ^s .92	63 ["] .97	56 ^s .86	15 ["] .12	56 ^s .67	26 ["] .53	53 ^s .60	37 ["] .27	48 ^s .57	44 ["] .52	42 ^s .27	47 ["] .30
19	54 ^s .05	64 ["] .29	56 ^s .88	15 ["] .47	56 ^s .61	26 ["] .88	53 ^s .49	37 ["] .58	48 ^s .40	44 ["] .72	42 ^s .04	47 ["] .30
20	54 ^s .17	64 ["] .60	56 ^s .92	15 ["] .82	56 ^s .56	27 ["] .23	53 ^s .37	37 ["] .90	48 ^s .20	44 ["] .92	41 ^s .80	47 ["] .28
21	54 ^s .28	64 ["] .90	56 ^s .95	16 ["] .18	56 ^s .52	27 ["] .59	53 ^s .24	38 ["] .22	47 ^s .99	45 ["] .12	41 ^s .57	47 ["] .23
22	54 ^s .40	65 ["] .20	56 ^s .99	16 ["] .54	56 ^s .47	27 ["] .96	53 ^s .10	38 ["] .55	47 ^s .76	45 ["] .29	41 ^s .36	47 ["] .16
23	54 ^s .51	65 ["] .49	57 ^s .05	16 ["] .91	56 ^s .43	28 ["] .35	52 ^s .94	38 ["] .88	47 ^s .53	45 ["] .43	41 ^s .16	47 ["] .09
24	54 ^s .64	65 ["] .78	57 ^s .11	17 ["] .31	56 ^s .39	28 ["] .76	52 ^s .77	39 ["] .20	47 ^s .31	45 ["] .54	40 ^s .98	47 ["] .03
25	54 ^s .77	66 ["] .08	57 ^s .16	17 ["] .73	56 ^s .33	29 ["] .17	52 ^s .59	39 ["] .49	47 ^s .09	45 ["] .64	40 ^s .81	46 ["] .99
26	54 ^s .92	66 ["] .39	57 ^s .20	18 ["] .16	56 ^s .25	29 ["] .58	52 ^s .40	39 ["] .76	46 ^s .88	45 ["] .73	40 ^s .64	46 ["] .97
27	55 ^s .07	66 ["] .73	57 ^s .22	18 ["] .61	56 ^s .15	29 ["] .99	52 ^s .21	39 ["] .99	46 ^s .69	45 ["] .83	40 ^s .47	46 ["] .96
28	55 ^s .22	67 ["] .09	57 ^s .23	19 ["] .06	56 ^s .05	30 ["] .38	52 ^s .03	40 ["] .21	46 ^s .50	45 ["] .93	40 ^s .29	46 ["] .95
29	55 ^s .35	67 ["] .47	57 ^s .22	19 ["] .49	55 ^s .93	30 ["] .74	51 ^s .87	40 ["] .43	46 ^s .33	46 ["] .04	40 ^s .11	46 ["] .94
30	55 ^s .48	67 ["] .86			55 ^s .81	31 ["] .08	51 ^s .73	40 ["] .65	46 ^s .16	46 ["] .17	39 ^s .90	46 ["] .90
31	55 ^s .60	68 ["] .26			55 ^s .70	31 ["] .40	51 ^s .59	40 ["] .89	45 ^s .98	46 ["] .31	39 ^s .69	46 ["] .85
32	55 ^s .70	68 ["] .66			55 ^s .60	31 ["] .72			45 ^s .79	46 ["] .46		

Mean R.A. 10^h 59^m 50^s.562 Mean Dec. —84° 13' 21".75 Sec δ 9.93 Tan δ —9.88

AT UPPER TRANSIT AT GREENWICH.

 η Octantis. Mag. 6.26

Day.	JULY.		AUGUST.		SEPTEMBER.		OCTOBER.		NOVEMBER.		DECEMBER.	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ^m ^s 10 59 84 13	—	^h ^m ^s 10 59 84 13	—	^h ^m ^s 10 59 84 13	—	^h ^m ^s 10 59 84 13	—	^h ^m ^s 10 59 84 13	—	^h ^m ^s 10 59 84 13	—
1	39°69	46°85	34°39	42°14	31°79	33°69	32°72	24°75	37°13	18°04	43°43	16°30
2	39°46	46°78	34°25	41°87	31°78	33°38	32°83	24°50	37°29	17°91	43°63	16°31
3	39°24	46°68	34°12	41°60	31°79	33°08	32°94	24°27	37°45	17°77	43°83	16°32
4	39°03	46°56	34°00	41°34	31°79	32°80	33°04	24°04	37°61	17°61	44°06	16°34
5	38°82	46°44	33°90	41°08	31°79	32°54	33°12	23°81	37°77	17°45	44°30	16°38
6	38°62	46°31	33°81	40°83	31°79	32°27	33°20	23°56	37°96	17°29	44°55	16°44
7	38°44	46°17	33°72	40°60	31°77	32°00	33°28	23°29	38°16	17°14	44°81	16°52
8	38°27	46°03	33°63	40°39	31°75	31°73	33°36	23°01	38°38	16°99	45°06	16°63
9	38°11	45°90	33°54	40°18	31°72	31°43	33°45	22°71	38°62	16°87	45°32	16°76
10	37°96	45°78	33°43	39°98	31°69	31°12	33°56	22°42	38°85	16°78	45°56	16°89
11	37°81	45°68	33°30	39°76	31°67	30°79	33°69	22°15	39°09	16°72	45°77	17°03
12	37°65	45°59	33°18	39°52	31°66	30°45	33°84	21°89	39°32	16°68	45°98	17°17
13	37°48	45°50	33°05	39°26	31°67	30°11	34°00	21°66	39°54	16°65	46°18	17°30
14	37°30	45°40	32°92	38°98	31°71	29°79	34°16	21°44	39°74	16°62	46°37	17°41
15	37°10	45°29	32°80	38°68	31°76	29°47	34°33	21°25	39°93	16°57	46°57	17°52
16	36°90	45°15	32°70	38°37	31°82	29°17	34°48	21°07	40°12	16°51	46°77	17°61
17	36°70	44°99	32°62	38°06	31°88	28°90	34°61	20°88	40°31	16°44	46°98	17°71
18	36°50	44°81	32°56	37°77	31°94	28°64	34°75	20°69	40°49	16°36	47°20	17°82
19	36°32	44°62	32°51	37°49	31°99	28°38	34°88	20°49	40°70	16°28	47°43	17°94
20	36°16	44°41	32°47	37°23	32°02	28°13	35°00	20°27	40°92	16°19	47°66	18°08
21	36°01	44°21	32°43	36°99	32°05	27°85	35°13	20°04	41°14	16°12	47°90	18°24
22	35°88	44°02	32°38	36°74	32°07	27°55	35°27	19°79	41°38	16°07	48°15	18°42
23	35°75	43°85	32°31	36°50	32°09	27°24	35°42	19°55	41°63	16°05	48°38	18°63
24	35°62	43°70	32°23	36°24	32°13	26°91	35°59	19°32	41°88	16°04	48°61	18°85
25	35°50	43°54	32°15	35°96	32°17	26°58	35°77	19°09	42°13	16°06	48°82	19°07
26	35°36	43°39	32°07	35°66	32°23	26°25	35°96	18°89	42°38	16°10	49°01	19°30
27	35°20	43°22	31°99	35°33	32°31	25°92	36°15	18°70	42°61	16°15	49°19	19°52
28	35°03	43°04	31°92	35°01	32°40	25°61	36°35	18°54	42°83	16°20	49°36	19°73
29	34°87	42°85	31°87	34°67	32°50	25°31	36°55	18°39	43°04	16°24	49°53	19°92
30	34°70	42°63	31°83	34°33	32°61	25°02	36°75	18°27	43°23	16°28	49°70	20°11
31	34°54	42°39	31°80	34°01	32°72	24°75	36°95	18°15	43°43	16°30	49°89	20°28
32	34°39	42°14	31°79	33°69			37°13	18°04			50°10	20°47

Catalogue Number 676

Spectrum Ao

AT UPPER TRANSIT AT GREENWICH.

δ Octantis. Mag. 4.14

Day.	JANUARY.		FEBRUARY.		MARCH.		APRIL.		MAY.		JUNE.	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ^m ^s 14 15 83 20	—	^h ^m ^s 14 15 83 21	—	^h ^m ^s 14 15 83 21	—	^h ^m ^s 14 15 83 21	—	^h ^m ^s 14 15 83 21	—	^h ^m ^s 14 15 83 21	—
1	28 ^s 59	59°17	35 ^s 41	00°75	40 ^s 98	06°53	45 ^s 36	16°35	47 ^s 33	27°38	46 ^s 71	37°75
2	28.82	59.12	35.62	00.94	41.15	06.84	45.44	16.68	47.37	27.71	46.67	38.09
3	29.06	59.10	35.81	01.14	41.29	07.14	45.53	17.00	47.42	28.06	46.61	38.42
4	29.31	59.12	36.01	01.31	41.43	07.43	45.63	17.31	47.47	28.42	46.52	38.75
5	29.53	59.15	36.19	01.47	41.58	07.70	45.75	17.62	47.51	28.82	46.43	39.06
6	29.73	59.18	36.37	01.61	41.73	07.95	45.88	17.95	47.53	29.22	46.32	39.35
7	29.93	59.22	36.56	01.73	41.90	08.20	46.00	18.31	47.53	29.62	46.21	39.63
8	30.11	59.23	36.77	01.86	42.07	08.45	46.12	18.69	47.51	30.00	46.10	39.89
9	30.30	59.22	37.00	02.00	42.25	08.71	46.22	19.08	47.49	30.37	46.00	40.13
10	30.49	59.21	37.23	02.16	42.44	09.00	46.32	19.48	47.46	30.71	45.90	40.36
11	30.69	59.18	37.47	02.34	42.63	09.31	46.39	19.86	47.42	31.04	45.81	40.58
12	30.92	59.15	37.70	02.54	42.82	09.63	46.45	20.25	47.39	31.36	45.73	40.81
13	31.16	59.13	37.92	02.76	42.99	09.98	46.51	20.63	47.36	31.67	45.66	41.05
14	31.41	59.15	38.13	03.00	43.14	10.33	46.55	20.99	47.34	31.97	45.59	41.29
15	31.66	59.19	38.33	03.24	43.28	10.67	46.59	21.34	47.32	32.27	45.52	41.55
16	31.90	59.25	38.52	03.48	43.41	11.00	46.64	21.67	47.32	32.58	45.45	41.82
17	32.14	59.33	38.69	03.71	43.52	11.33	46.68	21.99	47.33	32.90	45.36	42.10
18	32.36	59.43	38.86	03.93	43.64	11.64	46.74	22.31	47.33	33.24	45.25	42.39
19	32.58	59.52	39.03	04.15	43.75	11.95	46.82	22.64	47.32	33.59	45.12	42.67
20	32.78	59.61	39.20	04.35	43.86	12.24	46.89	22.97	47.31	33.96	44.98	42.92
21	32.97	59.68	39.37	04.54	43.99	12.52	46.97	23.32	47.28	34.34	44.84	43.14
22	33.16	59.75	39.55	04.72	44.12	12.80	47.05	23.69	47.23	34.72	44.70	43.34
23	33.35	59.82	39.75	04.92	44.26	13.09	47.12	24.08	47.17	35.07	44.56	43.52
24	33.55	59.88	39.96	05.13	44.41	13.41	47.18	24.49	47.10	35.40	44.45	43.70
25	33.75	59.93	40.17	05.37	44.57	13.73	47.22	24.91	47.03	35.71	44.35	43.87
26	33.96	59.99	40.39	05.64	44.72	14.08	^{47.24} ^{47.25}	^{25.31} ^{25.70}	46.95	36.00	44.26	44.06
27	34.19	60.06	40.59	05.92	44.87	14.46	47.25	26.06	46.89	36.28	44.17	44.26
28	34.44	60.16	40.79	06.22	45.00	14.85	47.25	26.41	46.84	36.55	44.07	44.46
29	34.68	60.27	40.98	06.53	45.11	15.25	47.26	26.74	46.81	36.82	43.97	44.67
30	34.93	60.40			45.20	15.63	47.29	27.06	46.78	37.12	43.85	44.90
31	35.18	60.57			45.28	16.00	47.33	27.38	46.75	37.43	43.71	45.12
32	35.41	60.75			45.36	16.35			46.71	37.75		

Mean R.A. 14^h 15^m 38^s.359 Mean Dec. —83° 21' 14".75 Sec δ 8.64 Tan δ —8.58

AT UPPER TRANSIT AT GREENWICH.

♄ Octantis. Mag. 4.14

Day.	JULY.		AUGUST.		SEPTEMBER.		OCTOBER.		NOVEMBER.		DECEMBER.	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ₁₄ ^m ₁₅ ^s ₈₃	[°] ₂₁ ['] _— ["] _—	^h ₁₄ ^m ₁₅ ^s ₈₃	[°] ₂₁ ['] _— ["] _—	^h ₁₄ ^m ₁₅ ^s ₈₃	[°] ₂₁ ['] _— ["] _—	^h ₁₄ ^m ₁₅ ^s ₈₃	[°] ₂₁ ['] _— ["] _—	^h ₁₄ ^m ₁₅ ^s ₈₃	[°] ₂₁ ['] _— ["] _—	^h ₁₄ ^m ₁₅ ^s ₈₃	[°] ₂₁ ['] _— ["] _—
1	43°71	45°12	38°90	48°16	33°94	45°72	30°68	39°01	30°29	29°98	33°13	22°23
2	43°55	45°34	38°72	48°14	33°81	45°53	30°64	38°73	30°34	29°74	33°25	22°03
3	43°40	45°53	38°53	48°10	33°69	45°33	30°61	38°47	30°36	29°48	33°37	21°82
4	43°23	45°70	38°36	48°06	33°57	45°14	30°57	38°23	30°39	29°20	33°50	21°59
5	43°06	45°84	38°19	48°01	33°46	44°97	30°51	38°01	30°41	28°91	33°65	21°36
6	42°90	45°96	38°04	47°96	33°36	44°82	30°44	37°78	30°45	28°61	33°82	21°13
7	42°74	46°07	37°91	47°92	33°23	44°69	30°37	37°52	30°49	28°29	34°00	20°90
8	42°60	46°17	37°77	47°90	33°10	44°55	30°29	37°24	30°56	27°97	34°19	20°71
9	42°47	46°27	37°64	47°89	32°96	44°40	30°22	36°94	30°65	27°66	34°40	20°54
10	42°34	46°37	37°49	47°89	32°80	44°22	30°16	36°62	30°75	27°36	34°60	20°39
11	42°21	46°49	37°34	47°90	32°65	44°02	30°11	36°29	30°86	27°08	34°79	20°26
12	42°10	46°61	37°16	47°89	32°51	43°81	30°09	35°96	30°97	26°82	34°96	20°15
13	41°98	46°75	36°98	47°88	32°37	43°57	30°08	35°63	31°08	26°58	35°13	20°04
14	41°85	46°92	36°80	47°84	32°25	43°33	30°08	35°33	31°18	26°34	35°28	19°91
15	41°70	47°08	36°61	47°77	32°15	43°07	30°10	35°03	31°27	26°10	35°43	19°78
16	41°53	47°22	36°42	47°68	32°07	42°81	30°11	34°75	31°35	25°86	35°58	19°63
17	41°36	47°35	36°24	47°57	31°98	42°57	30°11	34°49	31°42	25°60	35°74	19°48
18	41°17	47°45	36°08	47°45	31°90	42°35	30°10	34°24	31°49	25°34	35°91	19°31
19	40°99	47°53	35°94	47°33	31°82	42°15	30°08	33°98	31°56	25°07	36°10	19°14
20	40°80	47°58	35°82	47°21	31°73	41°96	30°06	33°70	31°65	24°79	36°30	18°98
21	40°63	47°61	35°69	47°11	31°63	41°76	30°03	33°41	31°75	24°50	36°50	18°84
22	40°48	47°64	35°56	47°03	31°52	41°54	30°00	33°10	31°87	24°21	36°72	18°71
23	40°35	47°68	35°43	46°95	31°40	41°31	29°99	32°77	31°99	23°93	36°95	18°61
24	40°22	47°73	35°28	46°88	31°28	41°06	29°98	32°44	32°13	23°66	37°17	18°54
25	40°09	47°78	35°12	46°80	31°16	40°80	29°98	32°10	32°28	23°41	37°39	18°48
26	39°96	47°85	34°94	46°70	31°04	40°51	30°00	31°76	32°44	23°17	37°60	18°43
27	39°81	47°93	34°77	46°58	30°95	40°21	30°03	31°42	32°59	22°96	37°79	18°40
28	39°65	48°01	34°59	46°45	30°87	39°91	30°07	31°11	32°74	22°77	37°97	18°37
29	39°47	48°08	34°42	46°29	30°80	39°61	30°12	30°80	32°89	22°59	38°15	18°31
30	39°29	48°12	34°25	46°10	30°73	39°30	30°18	30°51	33°02	22°41	38°33	18°24
31	39°10	48°15	34°08	45°91	30°68	39°01	30°24	30°24	33°13	22°23	38°51	18°16
32	38°90	48°16	33°94	45°72			30°29	29°98			38°71	18°07

AT UPPER TRANSIT AT GREENWICH.

 ρ Octantis. Mag. 5.66

Day.	JANUARY.		FEBRUARY.		MARCH.		APRIL.		MAY.		JUNE.	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ₁₅ ^m ₂₆ ^s ₈₄ [°] _{14'}	—	^h ₁₅ ^m ₂₆ ^s ₈₄ [°] _{14'}	—	^h ₁₅ ^m ₂₇ ^s ₈₄ [°] _{14'}	—	^h ₁₅ ^m ₂₇ ^s ₈₄ [°] _{14'}	—	^h ₁₅ ^m ₂₇ ^s ₈₄ [°] _{14'}	—	^h ₁₅ ^m ₂₇ ^s ₈₄ [°] _{14'}	—
1	51 ^s .75	14 [°] 05'	59 ^s .44	12 [°] 08'	06 ^s .67	14 [°] 75'	13 ^s .46	21 ^s .87	17 ^s .81	31 ^s .18	19 ^s .44	41 ^s .87
2	52 ^s .00	13 [°] 90'	59 ^s .71	12 [°] 16'	06 ^s .92	14 [°] 96'	13 ^s .62	22 ^s .14	17 ^s .92	31 ^s .46	19 ^s .46	42 ^s .23
3	52 ^s .26	13 [°] 77'	59 ^s .96	12 [°] 25'	07 ^s .14	15 [°] 17'	13 ^s .79	22 ^s .39	18 ^s .04	31 ^s .76	19 ^s .46	42 ^s .60
4	52 ^s .51	13 [°] 66'	60 ^s .19	12 [°] 34'	07 ^s .36	15 [°] 36'	13 ^s .97	22 ^s .62	18 ^s .16	32 ^s .08	19 ^s .43	42 ^s .96
5	52 ^s .76	13 [°] 58'	60 ^s .42	12 [°] 40'	07 ^s .57	15 [°] 54'	14 ^s .17	22 ^s .86	18 ^s .29	32 ^s .42	19 ^s .39	43 ^s .30
6	52 ^s .98	13 [°] 51'	60 ^s .66	12 [°] 45'	07 ^s .78	15 [°] 71'	14 ^s .37	23 ^s .12	18 ^s .41	32 ^s .78	19 ^s .35	43 ^s .64
7	53 ^s .19	13 [°] 43'	60 ^s .90	12 [°] 47'	08 ^s .01	15 [°] 86'	14 ^s .58	23 ^s .41	18 ^s .51	33 ^s .15	19 ^s .29	43 ^s .97
8	53 ^s .40	13 [°] 34'	61 ^s .15	12 [°] 47'	08 ^s .25	16 [°] 01'	14 ^s .78	23 ^s .72	18 ^s .60	33 ^s .53	19 ^s .23	44 ^s .27
9	53 ^s .60	13 [°] 24'	61 ^s .42	12 [°] 47'	08 ^s .51	16 [°] 16'	14 ^s .98	24 ^s .04	18 ^s .67	33 ^s .91	19 ^s .16	44 ^s .55
10	53 ^s .80	13 [°] 13'	61 ^s .71	12 [°] 49'	08 ^s .78	16 [°] 33'	15 ^s .16	24 ^s .37	18 ^s .72	34 ^s .28	19 ^s .10	44 ^s .81
11	54 ^s .02	13 [°] 00'	62 ^s .01	12 [°] 54'	09 ^s .05	16 [°] 53'	15 ^s .33	24 ^s .71	18 ^s .76	34 ^s .64	19 ^s .05	45 ^s .07
12	54 ^s .26	12 [°] 86'	62 ^s .30	12 [°] 61'	09 ^s .31	16 [°] 75'	15 ^s .47	25 ^s .06	18 ^s .79	34 ^s .98	19 ^s .01	45 ^s .34
13	54 ^s .51	12 [°] 72'	62 ^s .59	12 [°] 70'	09 ^s .56	17 [°] 00'	15 ^s .61	25 ^s .39	18 ^s .82	35 ^s .30	18 ^s .98	45 ^s .61
14	54 ^s .78	12 [°] 60'	62 ^s .86	12 [°] 82'	09 ^s .80	17 [°] 26'	15 ^s .73	25 ^s .70	18 ^s .86	35 ^s .61	18 ^s .96	45 ^s .90
15	55 ^s .07	12 [°] 51'	63 ^s .12	12 [°] 95'	10 ^s .02	17 [°] 51'	15 ^s .84	26 ^s .01	{18 ^s .89} {18 ^s .95}	{35 ^s .91} {36 ^s .21}	18 ^s .94	46 ^s .21
16	55 ^s .34	12 [°] 45'	63 ^s .37	13 [°] 09'	10 ^s .22	17 [°] 76'	15 ^s .96	26 ^s .31	19 ^s .01	36 ^s .51	18 ^s .91	46 ^s .53
17	55 ^s .61	12 [°] 42'	63 ^s .61	13 [°] 22'	10 ^s .42	18 [°] 01'	16 ^s .09	26 ^s .60	19 ^s .08	36 ^s .82	18 ^s .87	46 ^s .86
18	55 ^s .87	12 [°] 40'	63 ^s .84	13 [°] 35'	10 ^s .61	18 [°] 26'	16 ^s .22	26 ^s .88	19 ^s .15	37 ^s .15	18 ^s .82	47 ^s .20
19	56 ^s .12	12 [°] 38'	64 ^s .06	13 [°] 47'	10 ^s .80	18 [°] 49'	16 ^s .36	27 ^s .15	19 ^s .22	37 ^s .50	18 ^s .74	47 ^s .54
20	56 ^s .35	12 [°] 36'	64 ^s .29	13 [°] 57'	10 ^s .99	18 [°] 70'	16 ^s .52	27 ^s .43	19 ^s .29	37 ^s .87	18 ^s .64	47 ^s .87
21	56 ^s .58	12 [°] 33'	64 ^s .52	13 [°] 65'	11 ^s .18	18 [°] 91'	16 ^s .68	27 ^s .74	19 ^s .33	38 ^s .25	18 ^s .53	48 ^s .16
22	56 ^s .81	12 [°] 29'	64 ^s .76	13 [°] 74'	11 ^s .38	19 [°] 11'	16 ^s .84	28 ^s .07	19 ^s .36	38 ^s .64	18 ^s .42	48 ^s .42
23	57 ^s .02	12 [°] 25'	65 ^s .01	13 [°] 83'	11 ^s .61	19 [°] 32'	17 ^s .00	28 ^s .42	19 ^s .36	39 ^s .03	18 ^s .32	48 ^s .65
24	57 ^s .25	12 [°] 19'	65 ^s .28	13 [°] 92'	11 ^s .84	19 [°] 54'	17 ^s .15	28 ^s .78	19 ^s .35	39 ^s .39	18 ^s .23	48 ^s .89
25	57 ^s .49	12 [°] 14'	65 ^s .56	14 [°] 04'	12 ^s .07	19 [°] 79'	17 ^s .28	29 ^s .15	19 ^s .34	39 ^s .72	18 ^s .15	49 ^s .11
26	57 ^s .73	12 [°] 08'	65 ^s .84	14 [°] 18'	12 ^s .31	20 [°] 04'	17 ^s .39	29 ^s .53	19 ^s .33	40 ^s .04	18 ^s .08	49 ^s .34
27	57 ^s .99	12 [°] 03'	66 ^s .13	14 [°] 34'	12 ^s .54	20 [°] 32'	17 ^s .49	29 ^s .90	19 ^s .32	40 ^s .33	18 ^s .03	49 ^s .60
28	58 ^s .27	11 [°] 99'	66 ^s .41	14 [°] 54'	12 ^s .77	20 [°] 64'	17 ^s .57	30 ^s .25	19 ^s .32	40 ^s .62	17 ^s .97	49 ^s .86
29	58 ^s .56	11 [°] 97'	66 ^s .67	14 [°] 75'	12 ^s .97	20 [°] 96'	17 ^s .65	30 ^s .59	19 ^s .34	40 ^s .91	17 ^s .90	50 ^s .13
30	58 ^s .86	11 [°] 98'			13 ^s .15	21 [°] 27'	17 ^s .72	30 ^s .89	19 ^s .37	41 ^s .21	17 ^s .82	50 ^s .41
31	59 ^s .15	12 [°] 01'			13 ^s .31	21 [°] 58'	17 ^s .81	31 ^s .18	19 ^s .40	41 ^s .53	17 ^s .72	50 ^s .70
32	59 ^s .44	12 [°] 08'			13 ^s .46	21 [°] 87'			19 ^s .44	41 ^s .87		

Mean R.A. 15^h 27^m 05^s.675 Mean Dec. -84° 14' 23".90 Sec δ 9.96 Tan δ -9.91

AT UPPER TRANSIT AT GREENWICH.

 ρ Octantis. Mag. 5.66

Day.	JULY.		AUGUST.		SEPTEMBER.		OCTOBER.		NOVEMBER.		DECEMBER.	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ^m ^s 15 27 84 14	—	^h ^m ^s 15 27 84 14	—	^h ^m ^s 15 27 84 14	—	^h ^m ^s 15 26 84 14	—	^h ^m ^s 15 26 84 14	—	^h ^m ^s 15 27 84 14	—
1	17 ^s .72	50°70	13 ^s .14	56°34	07 ^s .30	56°78	62 ^s .44	52°21	59°96	43°90	01 ^s .37	35°11
2	17.59	50°99	12.93	56°42	07.18	56°67	62.32	51°97	59°93	43°64	01.46	34°86
3	17.46	51°27	12.72	56°48	07°03	56°56	62°18	51°75	59°91	43°37	01°55	34°59
4	17.32	51°51	12°52	56°54	06°86	56°45	62°04	51°53	59°88	43°09	01°64	34°30
5	17.16	51°72	12°34	56°58	06°67	56°35	61°87	51°34	59°85	42°79	01°75	34°00
6	17°01	51°92	12°17	56°62	06°48	56°26	61°70	51°15	59°82	42°48	01°88	33°70
7	16°87	52°12	12°01	56°67	06°27	56°18	61°54	50°95	59°80	42°16	02°04	33°40
8	16°73	52°30	11°85	56°73	06°04	56°12	61°40	50°73	59°80	41°82	02°22	33°13
9	16°61	52°47	11°70	56°79	05°81	56°06	61°28	50°49	59°83	41°47	02°40	32°86
10	16°49	52°64	11°54	56°87	05°57	56°00	61°18	50°23	59°88	41°13	02°58	32°62
11	16°39	52°82	11°38	56°96	05°37	55°90	61°12	49°93	59°94	40°81	02°75	32°42
12	16°29	53°02	11°19	57°06	05°20	55°77	61°07	49°62	60°01	40°51	02°92	32°24
13	16°19	53°23	10°99	57°15	05°05	55°61	61°02	49°32	60°07	40°23	03°06	32°04
14	16°07	53°47	10°77	57°21	04°92	55°42	60°95	49°04	60°13	39°97	03°20	31°84
15	15°93	53°72	10°55	57°25	04°80	55°23	60°87	48°76	60°17	39°72	03°34	31°63
16	15°79	53°96	10°33	57°26	04°67	55°05	60°77	48°49	60°21	39°46	03°48	31°40
17	15°62	54°18	10°12	57°25	04°52	54°88	60°66	48°24	60°23	39°20	03°62	31°15
18	15°44	54°38	09°92	57°22	04°35	54°72	60°54	48°00	60°26	38°91	03°76	30°90
19	15°26	54°55	09°74	57°18	04°17	54°57	60°43	47°76	60°29	38°60	03°93	30°65
20	15°08	54°70	09°58	57°15	03°97	54°44	60°32	47°52	60°32	38°28	04°12	30°40
21	14°90	54°83	09°42	57°13	03°77	54°31	60°24	47°26	60°37	37°94	04°31	30°15
22	14°74	54°94	09°27	57°13	03°58	54°17	60°18	46°98	60°43	37°60	04°52	29°92
23	14°60	55°05	09°10	57°14	03°40	54°02	60°13	46°69	60°51	37°26	04°74	29°71
24	14°47	55°18	08°92	57°16	03°22	53°85	60°11	46°37	60°60	36°93	04°96	29°52
25	14°35	55°32	08°73	57°17	03°07	53°65	60°10	46°04	60°71	36°62	05°18	29°36
26	14°23	55°47	08°52	57°17	02°94	53°43	60°11	45°70	60°83	36°34	05°39	29°22
27	14°08	55°63	08°30	57°15	02°84	53°19	60°11	45°37	60°96	36°06	05°60	29°10
28	13°92	55°80	08°08	57°12	02°74	52°95	60°10	45°04	61°08	35°81	05°80	28°97
29	13°73	55°96	07°86	57°06	02°64	52°71	60°08	44°73	61°19	35°57	05°98	28°83
30	13°54	56°10	07°64	56°99	02°54	52°46	60°04	44°44	61°28	35°34	06°15	28°67
31	13°34	56°23	07°45	56°89	02°44	52°21	60°00	44°16	61°37	35°11	06°33	28°50
32	13°14	56°34	07°30	56°78			59°96	43°90			06°53	28°32

AT UPPER TRANSIT AT GREENWICH.

44 G Octantis. Mag. 6.32

Day.	JANUARY.		FEBRUARY.		MARCH.		APRIL.		MAY.		JUNE.	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ^m ^s 19 43 81 31	[°] ['] —	^h ^m ^s 19 43 81 31	[°] ['] —	^h ^m ^s 19 43 81 31	[°] ['] —	^h ^m ^s 19 43 81 31	[°] ['] —	^h ^m ^s 19 43 81 31	[°] ['] —	^h ^m ^s 19 43 81 31	[°] ['] —
1	16.70	50.79	18.30	40.56	21.61	32.59	26.67	26.93	31.99	25.28	37.05	27.70
2	16.72	50.42	18.42	40.26	21.78	32.38	26.83	26.82	32.15	25.25	37.22	27.82
3	16.75	50.06	18.53	39.99	21.93	32.18	26.98	26.70	32.31	25.22	37.38	27.97
4	16.79	49.72	18.62	39.73	22.08	31.98	27.14	26.57	32.50	25.20	37.54	28.15
5	16.84	49.40	18.71	39.47	22.22	31.79	27.30	26.43	32.69	25.19	37.70	28.34
6	16.89	49.11	18.79	39.18	22.35	31.57	27.48	26.28	32.89	25.21	37.85	28.55
7	16.92	48.82	18.87	38.87	22.47	31.34	27.67	26.13	33.09	25.25	37.98	28.76
8	16.95	48.54	18.95	38.54	22.60	31.10	27.87	25.99	33.28	25.31	38.11	28.98
9	16.96	48.25	19.04	38.21	22.75	30.83	28.07	25.89	33.47	25.39	38.22	29.20
10	16.97	47.93	19.14	37.87	22.90	30.56	28.27	25.81	33.64	25.48	38.32	29.41
11	16.97	47.59	19.26	37.52	23.08	30.31	28.47	25.75	33.81	25.57	38.42	29.60
12	16.98	47.24	19.39	37.19	23.26	30.09	28.66	25.71	33.96	25.67	38.53	29.77
13	17.01	46.87	19.52	36.89	23.44	29.87	28.84	25.68	34.11	25.76	38.64	29.93
14	17.05	46.49	19.65	36.60	23.62	29.67	29.01	25.65	34.25	25.84	38.75	30.09
15	17.11	46.11	19.78	36.33	23.79	29.50	29.17	25.62	34.39	25.91	38.88	30.25
16	17.17	45.75	19.91	36.08	23.96	29.35	29.33	25.59	34.54	25.97	39.02	30.41
17	17.24	45.41	20.04	35.83	24.12	29.20	29.48	25.55	34.68	26.02	39.16	30.59
18	17.31	45.10	20.16	35.58	24.27	29.06	29.64	25.49	34.85	26.07	39.30	30.80
19	17.39	44.80	20.27	35.34	24.42	28.92	29.80	25.41	35.02	26.12	39.44	31.03
20	17.45	44.51	20.37	35.10	24.56	28.75	29.97	25.33	35.20	26.18	39.56	31.29
21	17.51	44.22	20.47	34.84	24.70	28.58	30.15	25.25	35.39	26.27	39.67	31.56
22	17.56	43.93	20.59	34.57	24.85	28.39	30.35	25.18	35.58	26.39	39.77	31.84
23	17.61	43.63	20.70	34.28	25.00	28.19	30.55	25.14	35.76	26.54	39.85	32.09
24	17.66	43.32	20.82	33.97	25.17	27.99	30.76	25.12	35.93	26.70	39.93	32.33
25	17.70	42.99	20.96	33.66	25.34	27.79	30.96	25.13	36.08	26.87	40.01	32.55
26	17.75	42.66	21.11	33.36	25.54	27.60	31.16	25.16	36.22	27.03	40.09	32.74
27	17.80	42.31	21.27	33.08	25.74	27.44	31.35	25.20	36.35	27.18	40.18	32.92
28	17.88	41.95	21.44	32.83	25.94	27.31	31.52	25.24	36.47	27.31	40.28	33.11
29	17.96	41.58	21.61	32.59	26.15	27.19	31.67	25.26	36.60	27.43	40.39	33.31
30	18.06	41.22			26.33	27.10	31.83	25.28	36.73	27.52	40.50	33.55
31	18.18	40.88			26.51	27.02	31.99	25.28	36.88	27.61	40.61	33.79
32	18.30	40.56			26.67	26.93			37.05	27.70		

Mean R.A. 19^h 43^m 25^s.197 Mean Dec. —81° 31' 36".68 Sec δ 6.79 Tan δ —6.71

AT UPPER TRANSIT AT GREENWICH.

44 G Octantis. Mag. 6.32

Day.	JULY.		AUGUST.		SEPTEMBER.		OCTOBER.		NOVEMBER.		DECEMBER.	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ^m ^s 19 43 81 31	—	^h ^m ^s 19 43 81 31	—	^h ^m ^s 19 43 81 31	—	^h ^m ^s 19 43 81 31	—	^h ^m ^s 19 43 81 31	—	^h ^m ^s 19 43 81 31	—
1	40°61	33°79	42°01	42°69	40°68	50°81	37°49	55°64	33°52	55°68	30°43	50°69
2	40°71	34°06	41°99	43°00	40°58	51°01	37°37	55°69	33°42	55°61	30°35	50°50
3	40°80	34°35	41°96	43°29	40°49	51°20	37°27	55°75	33°30	55°55	30°26	50°28
4	40°88	34°65	41°93	43°57	40°41	51°38	37°17	55°82	33°18	55°49	30°17	50°04
5	40°95	34°95	41°90	43°83	40°34	51°55	37°06	55°90	33°06	55°43	30°07	49°77
6	41°00	35°25	41°87	44°07	40°28	51°74	36°95	56°00	32°92	55°34	29°98	49°49
7	41°05	35°53	41°85	44°30	40°22	51°94	36°83	56°11	32°77	55°22	29°92	49°17
8	41°09	35°80	41°84	44°54	40°15	52°16	36°70	56°22	32°63	55°09	29°86	48°85
9	41°14	36°06	41°84	44°79	40°07	52°40	36°56	56°31	32°49	54°92	29°82	48°53
10	41°18	36°30	41°84	45°06	39°98	52°65	36°41	56°37	32°37	54°73	29°79	48°24
11	41°23	36°52	41°85	45°34	39°88	52°88	36°25	56°41	32°26	54°54	29°77	47°96
12	41°29	36°74	41°85	45°64	39°76	53°10	36°09	56°42	32°17	54°35	29°75	47°69
13	41°37	36°97	41°83	45°95	39°64	53°29	35°95	56°40	32°09	54°17	29°71	47°43
14	41°44	37°23	41°80	46°27	39°51	53°45	35°83	56°36	32°01	54°01	29°66	47°19
15	41°52	37°49	41°75	46°59	39°39	53°58	35°70	56°32	31°92	53°87	29°62	46°95
16	41°60	37°78	41°69	46°88	39°28	53°70	35°59	56°30	31°83	53°76	29°57	46°70
17	41°66	38°08	41°62	47°15	39°17	53°82	35°49	56°29	31°72	53°64	29°51	46°42
18	41°71	38°41	41°56	47°40	39°08	53°94	35°38	56°29	31°61	53°49	29°45	46°13
19	{41°74 41°76}	{38°74 39°06}	41°50	47°61	38°99	54°07	35°26	56°32	31°49	53°33	29°39	45°83
20	41°78	39°35	41°45	47°81	38°91	54°22	35°14	56°35	31°36	53°16	29°34	45°50
21	41°78	39°62	41°41	48°02	38°82	54°39	35°00	56°38	31°24	52°97	29°31	45°16
22	41°79	39°87	41°38	48°23	38°71	54°56	34°85	56°40	31°12	52°77	29°28	44°81
23	41°81	40°10	41°34	48°47	38°60	54°74	34°70	56°39	31°01	52°54	29°27	44°46
24	41°84	40°34	41°30	48°73	38°47	54°92	34°54	56°36	30°91	52°29	29°27	44°12
25	41°87	40°58	41°26	49°01	38°34	55°08	34°39	56°31	30°82	52°03	29°28	43°79
26	41°91	40°84	41°21	49°29	38°20	55°22	34°24	56°24	30°74	51°78	29°30	43°49
27	41°95	41°12	41°15	49°58	38°05	55°34	34°09	56°16	30°67	51°54	29°31	43°19
28	41°98	41°42	41°07	49°85	37°91	55°44	33°95	56°06	30°62	51°30	29°31	42°91
29	42°01	41°73	40°98	50°12	37°76	55°52	33°83	55°96	30°56	51°08	29°30	42°64
30	42°02	42°05	40°89	50°38	37°63	55°58	33°73	55°85	30°50	50°88	29°29	42°36
31	42°03	42°37	40°78	50°61	37°49	55°64	33°62	55°76	30°43	50°69	29°27	42°05
32	42°01	42°69	40°68	50°81			33°52	55°68			29°25	41°73

AT UPPER TRANSIT AT GREENWICH.

 σ Octantis. Mag. 5.48

Day.	JANUARY.		FEBRUARY.		MARCH.		APRIL.		MAY.		JUNE.	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ^m ^s 19 47 89 II	—	^h ^m ^s 19 47 89 II	—	^h ^m ^s 19 48 89 II	—	^h ^m ^s 19 49 89 II	—	^h ^m ^s 19 50 89 II	—	^h ^m ^s 19 50 89 II	—
1	35.57	46.34	47.96	35.42	19.65	26.92	09.85	20.91	03.00	19.18	53.22	21.81
2	35.58	45.95	49.03	35.10	21.28	26.70	11.44	20.80	04.60	19.16	54.81	21.94
3	35.73	45.57	50.05	34.81	22.82	26.48	13.01	20.68	06.28	19.14	56.42	22.10
4	35.99	45.21	50.99	34.53	24.27	26.26	14.59	20.54	08.06	19.12	58.01	22.28
5	36.27	44.87	51.83	34.25	25.62	26.04	16.24	20.38	09.92	19.11	59.54	22.48
6	36.57	44.55	52.59	33.94	26.91	25.82	17.99	20.22	11.84	19.13	60.98	22.70
7	36.80	44.25	53.33	33.61	28.20	25.58	19.83	20.06	13.77	19.17	62.32	22.93
8	36.93	43.95	54.10	33.27	29.54	25.31	21.76	19.92	15.67	19.23	63.56	23.15
9	36.97	43.64	54.94	32.91	30.96	25.03	23.74	19.81	17.51	19.31	64.72	23.37
10	36.96	43.30	55.89	32.55	32.50	24.75	25.72	19.72	19.27	19.41	65.81	23.59
11	36.95	42.94	56.95	32.19	34.14	24.49	27.67	19.66	20.93	19.52	66.87	23.79
12	37.00	42.56	58.12	31.84	35.85	24.26	29.57	19.63	22.52	19.63	67.92	23.97
13	37.14	42.16	59.36	31.50	37.61	24.04	31.39	19.60	24.04	19.73	68.99	24.14
14	37.41	41.76	60.64	31.19	39.38	23.83	33.13	19.56	25.51	19.81	70.12	24.31
15	37.80	41.36	61.93	30.90	41.11	23.65	34.80	19.52	26.96	19.88	71.33	24.48
16	38.30	40.98	63.19	30.62	42.80	23.48	36.43	19.48	28.42	19.94	72.62	24.66
17	38.86	40.62	64.40	30.36	44.42	23.33	38.02	19.44	29.93	20.00	73.96	24.86
18	39.45	40.27	65.55	30.10	45.97	23.18	39.61	19.38	31.52	20.06	75.33	25.09
19	40.03	39.93	66.65	29.85	47.47	23.02	41.24	19.30	33.20	20.12	76.67	25.34
20	40.59	39.62	67.72	29.59	48.94	22.85	42.94	19.22	34.97	20.19	77.91	25.62
21	41.10	39.31	68.76	29.31	50.39	22.66	44.73	19.14	36.79	20.29	79.02	25.90
22	41.56	39.00	69.82	29.01	51.85	22.46	46.62	19.08	38.60	20.42	80.00	26.19
23	41.98	38.68	70.92	28.70	53.39	22.25	48.61	19.04	40.37	20.58	80.86	26.46
24	42.38	38.35	72.11	28.38	55.03	22.04	50.64	19.02	42.04	20.74	81.63	26.71
25	42.77	38.00	73.42	28.05	56.78	21.84	52.66	19.02	43.58	20.91	82.38	26.95
26	43.20	37.64	74.84	27.74	58.62	21.64	54.62	19.05	45.00	21.08	83.17	27.16
27	43.70	37.27	76.38	27.44	60.55	21.46	56.48	19.09	46.33	21.24	84.04	27.36
28	44.31	36.89	78.00	27.17	62.53	21.31	58.23	19.13	47.62	21.38	84.98	27.57
29	45.05	36.50	79.65	26.92	64.49	21.19	59.87	19.16	48.91	21.49	85.99	27.79
30	45.92	36.12			66.38	21.10	61.44	19.18	50.26	21.59	87.04	28.02
31	46.91	35.76			68.17	21.01	63.00	19.18	51.70	21.69	88.08	28.27
32	47.96	35.42			69.85	20.91			53.22	21.81		

Mean R.A. 19^h 48^m 59^s.914 Mean Dec. -89° 11' 31".98 Sec δ 70.93 Tan δ -70.93

AT UPPER TRANSIT AT GREENWICH.

 σ Octantis. Mag. 5.48

Day.	JULY.		AUGUST.		SEPTEMBER.		OCTOBER.		NOVEMBER.		DECEMBER.	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ₁₉ ^m ₅₁ ^s ₈₉ [°] _{II}	—	^h ₁₉ ^m ₅₁ ^s ₈₉ [°] _{II}	—	^h ₁₉ ^m ₅₀ ^s ₈₉ [°] _{II}	—	^h ₁₉ ^m ₅₀ ^s ₈₉ [°] _{II}	—	^h ₁₉ ^m ₄₉ ^s ₈₉ [°] _{II}	—	^h ₁₉ ^m ₄₉ ^s ₈₉ [°] _{II}	—
1	28 ^s .08	28 [°] .27	41 ^s .17	37 [°] .72	86 ^s .40	46 [°] .39	51 ^s .81	51 [°] .57	67 ^s .63	51 [°] .67	31 ^s .65	46 [°] .41
2	29.06	28.55	40.96	38.05	85.38	46.60	50.49	51.62	66.43	51.60	30.71	46.19
3	29.95	28.86	40.68	38.35	84.40	46.80	49.24	51.67	65.18	51.54	29.69	45.96
4	30.74	29.17	40.36	38.64	83.48	46.99	48.04	51.75	63.83	51.48	28.62	45.70
5	31.43	29.49	40.04	38.92	82.64	47.17	46.86	51.85	62.39	51.41	27.55	45.42
6	32.02	29.81	39.75	39.18	81.88	47.38	45.65	51.97	60.86	51.32	26.53	45.13
7	32.53	30.10	39.50	39.44	81.14	47.60	44.35	52.08	59.29	51.20	25.63	44.80
8	32.98	30.38	39.32	39.70	80.37	47.83	42.94	52.18	57.74	51.04	24.86	44.46
9	33.40	30.65	39.22	39.96	79.54	48.07	41.41	52.27	56.25	50.86	24.23	44.12
10	33.83	30.92	39.16	40.24	78.59	48.33	39.79	52.33	54.87	50.66	23.70	43.81
11	34.30	31.16	39.11	40.55	77.51	48.58	38.13	52.37	53.60	50.46	23.23	43.51
12	34.84	31.40	39.01	40.86	76.30	48.81	36.50	52.39	52.45	50.27	22.77	43.22
13	35.45	31.65	38.81	41.20	75.02	49.02	34.94	52.38	51.38	50.09	22.27	42.95
14	36.13	31.90	38.48	41.54	73.70	49.20	33.47	52.36	50.34	49.93	21.72	42.69
15	36.83	32.18	38.00	41.86	72.41	49.34	32.10	52.33	49.26	49.78	21.10	42.43
16	37.53	32.49	37.39	42.17	71.18	49.48	30.81	52.30	48.14	49.65	20.43	42.16
17	38.15	32.83	36.72	42.45	70.04	49.61	29.55	52.29	46.95	49.52	19.72	41.88
18	38.66	33.18	36.04	42.71	68.97	49.74	28.29	52.30	45.68	49.37	19.01	41.57
19	39.01	33.53	35.38	42.94	67.95	49.89	26.98	52.33	44.35	49.20	18.32	41.24
20	39.23	33.87	34.80	43.18	66.94	50.05	25.59	52.36	42.99	49.01	17.68	40.89
21	{ 39.34 } { 39.46 }	{ 34.18 } { 34.47 }	34.29	43.41	65.89	50.22	24.11	52.38	41.63	48.82	17.14	40.52
22	39.47	34.73	33.85	43.65	64.76	50.40	22.54	52.39	40.30	48.60	16.69	40.15
23	39.59	34.98	33.42	43.91	63.53	50.59	20.92	52.38	39.01	48.36	16.36	39.78
24	39.79	35.23	32.98	44.18	62.21	50.78	19.26	52.35	37.81	48.10	16.15	39.42
25	40.06	35.48	32.48	44.46	60.80	50.95	17.59	52.30	36.71	47.83	16.04	39.07
26	40.38	35.76	31.88	44.76	59.31	51.10	15.95	52.24	35.73	47.55	15.99	38.74
27	40.70	36.06	31.17	45.05	57.79	51.24	14.35	52.16	34.86	47.30	15.94	38.43
28	40.98	36.37	30.36	45.35	56.25	51.35	12.82	52.06	34.06	47.07	15.85	38.14
29	41.18	36.70	29.46	45.64	54.71	51.44	11.40	51.95	33.29	46.84	15.69	37.85
30	41.29	37.04	28.48	45.91	53.22	51.51	10.08	51.85	32.51	46.62	15.45	37.54
31	41.28	37.38	27.45	46.16	51.81	51.57	08.83	51.76	31.65	46.41	15.13	37.21
32	41.17	37.72	26.40	46.39			07.63	51.67			14.80	36.86

AT UPPER TRANSIT AT GREENWICH.

48 G Octantis. Mag. 7.08

Day.	JANUARY.		FEBRUARY.		MARCH.		APRIL.		MAY.		JUNE.	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ₂₀ ^m ₂₆ ^s ₈₄ [°] ₃₈	—	^h ₂₀ ^m ₂₆ ^s ₈₄ [°] ₃₈	—	^h ₂₀ ^m ₂₆ ^s ₈₄ [°] ₃₈	—	^h ₂₀ ^m ₂₆ ^s ₈₄ [°] ₃₈	—	^h ₂₀ ^m ₂₆ ^s ₈₄ [°] ₃₈	—	^h ₂₀ ^m ₂₆ ^s ₈₄ [°] ₃₈	—
1	15 ^s .80	64 ["] .55	16 ^s .64	53 ["] .71	20 ^s .55	44 ["] .48	27 ^s .53	36 ["] .86	35 ^s .47	33 ["] .22	43 ^s .55	33 ["] .88
2	15 ^s .77	64 ["] .18	16 ^s .77	53 ["] .36	20 ^s .76	44 ["] .20	27 ^s .75	36 ["] .69	35 ^s .71	33 ["] .15	43 ^s .82	33 ["] .96
3	15 ^s .77	63 ["] .81	16 ^s .89	53 ["] .04	20 ^s .97	43 ["] .94	27 ^s .98	36 ["] .51	35 ^s .97	33 ["] .05	44 ^s .09	34 ["] .06
4	15 ^s .78	63 ["] .46	17 ^s .00	52 ["] .74	21 ^s .17	43 ["] .68	28 ^s .20	36 ["] .32	36 ^s .25	32 ["] .96	44 ^s .36	34 ["] .17
5	15 ^s .79	63 ["] .12	17 ^s .10	52 ["] .45	21 ^s .35	43 ["] .43	28 ^s .43	36 ["] .11	36 ^s .54	32 ["] .88	44 ^s .62	34 ["] .30
6	15 ^s .81	62 ["] .80	17 ^s .18	52 ["] .14	21 ^s .52	43 ["] .17	28 ^s .68	35 ["] .89	36 ^s .84	32 ["] .84	44 ^s .87	34 ["] .45
7	15 ^s .81	62 ["] .51	17 ^s .26	51 ["] .81	21 ^s .69	42 ["] .88	28 ^s .95	35 ["] .68	37 ^s .14	32 ["] .81	45 ^s .10	34 ["] .61
8	15 ^s .79	62 ["] .22	17 ^s .33	51 ["] .46	21 ^s .86	42 ["] .57	29 ^s .24	35 ["] .48	37 ^s .45	32 ["] .80	45 ^s .32	34 ["] .78
9	15 ^s .77	61 ["] .92	17 ^s .42	51 ["] .08	22 ^s .05	42 ["] .24	29 ^s .53	35 ["] .30	37 ^s .74	32 ["] .81	45 ^s .53	34 ["] .95
10	15 ^s .74	61 ["] .60	17 ^s .53	50 ["] .70	22 ^s .26	41 ["] .92	29 ^s .82	35 ["] .15	38 ^s .02	32 ["] .84	45 ^s .72	35 ["] .12
11	15 ^s .70	61 ["] .25	17 ^s .66	50 ["] .31	22 ^s .48	41 ["] .61	30 ^s .12	35 ["] .02	38 ^s .29	32 ["] .88	45 ^s .90	35 ["] .28
12	15 ^s .67	60 ["] .89	17 ^s .80	49 ["] .93	22 ^s .72	41 ["] .31	30 ^s .41	34 ["] .90	38 ^s .54	32 ["] .92	46 ^s .09	35 ["] .42
13	15 ^s .66	60 ["] .51	17 ^s .96	49 ["] .57	22 ^s .96	41 ["] .03	30 ^s .67	34 ["] .80	38 ^s .78	32 ["] .96	46 ^s .28	35 ["] .54
14	15 ^s .66	60 ["] .12	18 ^s .12	49 ["] .23	23 ^s .21	40 ["] .77	30 ^s .93	34 ["] .71	39 ^s .02	32 ["] .99	46 ^s .48	35 ["] .66
15	15 ^s .69	59 ["] .73	18 ^s .29	48 ["] .90	23 ^s .45	40 ["] .53	31 ^s .18	34 ["] .62	39 ^s .25	33 ["] .00	46 ^s .69	35 ["] .78
16	15 ^s .73	59 ["] .34	18 ^s .45	48 ["] .59	23 ^s .69	40 ["] .31	31 ^s .41	34 ["] .52	39 ^s .48	33 ["] .00	46 ^s .92	35 ["] .91
17	15 ^s .78	58 ["] .97	18 ^s .60	48 ["] .30	23 ^s .92	40 ["] .10	31 ^s .65	34 ["] .42	39 ^s .72	33 ["] .00	47 ^s .16	36 ["] .05
18	15 ^s .84	58 ["] .63	18 ^s .75	48 ["] .02	24 ^s .14	39 ["] .89	31 ^s .90	34 ["] .30	39 ^s .97	33 ["] .00	47 ^s .40	36 ["] .21
19	15 ^s .89	58 ["] .30	18 ^s .89	47 ["] .74	24 ^s .34	39 ["] .69	32 ^s .14	34 ["] .16	40 ^s .24	33 ["] .00	47 ^s .64	36 ["] .40
20	15 ^s .95	57 ["] .98	19 ^s .01	47 ["] .46	24 ^s .54	39 ["] .48	32 ^s .39	34 ["] .01	40 ^s .53	33 ["] .00	47 ^s .87	36 ["] .62
21	15 ^s .99	57 ["] .67	19 ^s .13	47 ["] .15	24 ^s .74	39 ["] .25	32 ^s .66	33 ["] .87	40 ^s .82	33 ["] .02	48 ^s .07	36 ["] .86
22	16 ^s .02	57 ["] .36	19 ^s .27	46 ["] .83	24 ^s .94	39 ["] .00	32 ^s .95	33 ["] .73	41 ^s .12	33 ["] .07	48 ^s .25	37 ["] .09
23	16 ^s .05	57 ["] .05	19 ^s .40	46 ["] .50	25 ^s .15	38 ["] .75	33 ^s .25	33 ["] .60	41 ^s .42	33 ["] .15	48 ^s .42	37 ["] .31
24	16 ^s .07	56 ["] .72	19 ^s .55	46 ["] .15	25 ^s .38	38 ["] .48	33 ^s .56	33 ["] .51	41 ^s .69	33 ["] .26	48 ^s .57	37 ["] .51
25	16 ^s .10	56 ["] .38	19 ^s .71	45 ["] .79	25 ^s .62	38 ["] .22	33 ^s .86	33 ["] .44	41 ^s .95	33 ["] .38	48 ^s .71	37 ["] .70
26	16 ^s .12	56 ["] .01	19 ^s .90	45 ["] .42	25 ^s .88	37 ["] .97	34 ^s .17	33 ["] .39	42 ^s .19	33 ["] .49	48 ^s .86	37 ["] .89
27	16 ^s .16	55 ["] .63	20 ^s .11	45 ["] .08	26 ^s .17	37 ["] .73	34 ^s .47	33 ["] .36	42 ^s .41	33 ["] .58	49 ^s .03	38 ["] .06
28	16 ^s .22	55 ["] .25	20 ^s .33	44 ["] .77	26 ^s .45	37 ["] .51	34 ^s .74	33 ["] .34	42 ^s .62	33 ["] .66	49 ^s .21	38 ["] .22
29	16 ^s .29	54 ["] .86	20 ^s .55	44 ["] .48	26 ^s .74	37 ["] .31	34 ^s .99	33 ["] .31	42 ^s .84	33 ["] .73	49 ^s .40	38 ["] .39
30	16 ^s .39	54 ["] .46			27 ^s .02	37 ["] .15	35 ^s .23	33 ["] .27	43 ^s .06	33 ["] .79	49 ^s .60	38 ["] .57
31	16 ^s .51	54 ["] .08			27 ^s .28	37 ["] .01	35 ^s .47	33 ["] .22	43 ^s .29	33 ["] .83	49 ^s .79	38 ["] .78
32	16 ^s .64	53 ["] .71			27 ^s .53	36 ["] .86			43 ^s .55	33 ["] .88		

Mean R.A. 20^h 26^m 26^s.942 Mean Dec. -84° 38' 47".39 Sec δ 10.72 Tan δ -10.67

AT UPPER TRANSIT AT GREENWICH.

48 G Octantis. Mag. 7.08

Day.	JULY.		AUGUST.		SEPTEMBER.		OCTOBER.		NOVEMBER.		DECEMBER.	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ₂₀ ^m ₂₆ ^s ₈₄ [°] ₃₈	—	^h ₂₀ ^m ₂₆ ^s ₈₄ [°] ₃₈	—	^h ₂₀ ^m ₂₆ ^s ₈₄ [°] ₃₈	—	^h ₂₀ ^m ₂₆ ^s ₈₄ [°] ₃₉	—	^h ₂₀ ^m ₂₆ ^s ₈₄ [°] ₃₉	—	^h ₂₀ ^m ₂₆ ^s ₈₄ [°] ₃₈	—
1	^s ₄₉ °79	^s ₃₈ °78	^s ₅₃ °07	^s ₄₇ °35	^s ₅₂ °03	^s ₅₆ °18	^s ₄₇ °63	^s ₀₂ °35	^s ₄₁ °30	^s ₀₄ °03	^s ₃₅ °62	^s ₆₀ °32
2	^s ₄₉ °98	^s ₃₉ °02	^s ₅₃ °07	^s ₄₇ °68	^s ₅₁ °90	^s ₅₆ °42	^s ₄₇ °46	^s ₀₂ °46	^s ₄₁ °13	^s ₀₄ °00	^s ₃₅ °46	^s ₆₀ °17
3	^s ₅₀ °15	^s ₃₉ °29	^s ₅₃ °07	^s ₄₇ °99	^s ₅₁ °78	^s ₅₆ °64	^s ₄₇ °29	^s ₀₂ °56	^s ₄₀ °95	^s ₀₃ °99	^s ₃₅ °29	^s ₆₀ °00
4	^s ₅₀ °31	^s ₃₉ °56	^s ₅₃ °07	^s ₄₈ °28	^s ₅₁ °68	^s ₅₆ °84	^s ₄₇ °13	^s ₀₂ °68	^s ₄₀ °75	^s ₀₃ °99	^s ₃₅ °11	^s ₅₉ °79
5	^s ₅₀ °46	^s ₃₉ °83	^s ₅₃ °05	^s ₄₈ °56	^s ₅₁ °58	^s ₅₇ °04	^s ₄₆ °97	^s ₀₂ °81	^s ₄₀ °53	^s ₀₃ °98	^s ₃₄ °92	^s ₅₉ °55
6	^s ₅₀ °59	^s ₄₀ °11	^s ₅₃ °04	^s ₄₈ °82	^s ₅₁ °50	^s ₅₇ °27	^s ₄₆ °81	^s ₀₂ °95	^s ₄₀ °29	^s ₀₃ °95	^s ₃₄ °75	^s ₅₉ °30
7	^s ₅₀ °70	^s ₄₀ °38	^s ₅₃ °04	^s ₄₉ °07	^s ₅₁ °42	^s ₅₇ °51	^s ₄₆ °64	^s ₀₃ °10	^s ₄₀ °05	^s ₀₃ °89	^s ₃₄ °59	^s ₅₉ °02
8	^s ₅₀ °80	^s ₄₀ °63	^s ₅₃ °05	^s ₄₉ °32	^s ₅₁ °34	^s ₅₇ °76	^s ₄₆ °45	^s ₀₃ °26	^s ₃₉ °81	^s ₀₃ °81	^s ₃₄ °45	^s ₅₈ °73
9	^s ₅₀ °90	^s ₄₀ °87	^s ₅₃ °07	^s ₄₉ °57	^s ₅₁ °25	^s ₅₈ °03	^s ₄₆ °24	^s ₀₃ °41	^s ₃₉ °57	^s ₀₃ °70	^s ₃₄ °33	^s ₅₈ °44
10	^s ₅₁ °00	^s ₄₁ °11	^s ₅₃ °11	^s ₄₉ °84	^s ₅₁ °15	^s ₅₈ °31	^s ₄₆ °01	^s ₀₃ °53	^s ₃₉ °36	^s ₀₃ °56	^s ₃₄ °23	^s ₅₈ °16
11	^s ₅₁ °11	^s ₄₁ °32	^s ₅₃ °14	^s ₅₀ °13	^s ₅₁ °02	^s ₅₈ °59	^s ₄₅ °76	^s ₀₃ °62	^s ₃₉ °17	^s ₀₃ °41	^s ₃₄ °13	^s ₅₇ °89
12	^s ₅₁ °23	^s ₄₁ °53	^s ₅₃ °17	^s ₅₀ °44	^s ₅₀ °87	^s ₅₈ °86	^s ₄₅ °53	^s ₀₃ °69	^s ₃₈ °98	^s ₀₃ °26	^s ₃₄ °05	^s ₅₇ °63
13	^s ₅₁ °36	^s ₄₁ °75	^s ₅₃ °19	^s ₅₀ °77	^s ₅₀ °70	^s ₅₉ °10	^s ₄₅ °30	^s ₀₃ °73	^s ₃₈ °81	^s ₀₃ °12	^s ₃₃ °06	^s ₅₇ °39
14	^s ₅₁ °50	^s ₄₁ °98	^s ₅₃ °18	^s ₅₁ °10	^s ₅₀ °52	^s ₅₉ °31	^s ₄₅ °09	^s ₀₃ °76	^s ₃₈ °65	^s ₀₃ °00	^s ₃₃ °85	^s ₅₇ °17
15	^s ₅₁ °65	^s ₄₂ °22	^s ₅₃ °15	^s ₅₁ °43	^s ₅₀ °35	^s ₅₉ °51	^s ₄₄ °89	^s ₀₃ °78	^s ₃₈ °48	^s ₀₂ °89	^s ₃₃ °74	^s ₅₆ °94
16	^s ₅₁ °80	^s ₄₂ °49	^s ₅₃ °11	^s ₅₁ °75	^s ₅₀ °20	^s ₅₉ °68	^s ₄₄ °71	^s ₀₃ °80	^s ₃₈ °30	^s ₀₂ °80	^s ₃₃ °61	^s ₅₆ °70
17	^s ₅₁ °95	^s ₄₂ °77	^s ₅₃ °04	^s ₅₂ °04	^s ₅₀ °05	^s ₅₉ °84	^s ₄₄ °53	^s ₀₃ °84	^s ₃₈ °12	^s ₀₂ °71	^s ₃₃ °47	^s ₅₆ °45
18	^s ₅₂ °07	^s ₄₃ °09	^s ₅₂ °96	^s ₅₂ °31	^s ₄₉ °92	^s ₅₉ °99	^s ₄₄ °35	^s ₀₃ °89	^s ₃₇ °92	^s ₀₂ °62	^s ₃₃ °34	^s ₅₆ °19
19	^s ₅₂ °16	^s ₄₃ °41	^s ₅₂ °90	^s ₅₂ °55	^s ₄₉ °80	^s ₆₀ °16	^s ₄₄ °17	^s ₀₃ °96	^s ₃₇ °71	^s ₀₂ °52	^s ₃₃ °20	^s ₅₅ °90
20	^s ₅₂ °23	^s ₄₃ °72	^s ₅₂ °85	^s ₅₂ °79	^s ₄₉ °67	^s ₆₀ °35	^s ₄₃ °98	^s ₀₄ °04	^s ₃₇ °49	^s ₀₂ °39	^s ₃₃ °08	^s ₅₅ °59
21	^s ₅₂ °29	^s ₄₄ °01	^s ₅₂ °81	^s ₅₃ °03	^s ₄₉ °54	^s ₆₀ °55	^s ₄₃ °76	^s ₀₄ °12	^s ₃₇ °28	^s ₀₂ °25	^s ₃₂ °97	^s ₅₅ °27
22	^s ₅₂ °34	^s ₄₄ °29	^s ₅₂ °78	^s ₅₃ °28	^s ₄₉ °39	^s ₆₀ °77	^s ₄₃ °54	^s ₀₄ °20	^s ₃₇ °06	^s ₀₂ °10	^s ₃₂ °87	^s ₅₄ °93
23	^s ₅₂ °39	^s ₄₄ °55	^s ₅₂ °76	^s ₅₃ °54	^s ₄₉ °24	^s ₆₀ °99	^s ₄₃ °30	^s ₀₄ °25	^s ₃₆ °85	^s ₀₁ °92	^s ₃₂ °80	^s ₅₄ °58
24	^s ₅₂ °44	^s ₄₄ °78	^s ₅₂ °73	^s ₅₃ °82	^s ₄₉ °07	^s ₆₁ °22	^s ₄₃ °05	^s ₀₄ °29	^s ₃₆ °65	^s ₀₁ °71	^s ₃₂ °74	^s ₅₄ °25
25	^s ₅₂ °51	^s ₄₅ °00	^s ₅₂ °69	^s ₅₄ °11	^s ₄₈ °88	^s ₆₁ °44	^s ₄₂ °79	^s ₀₄ °30	^s ₃₆ °47	^s ₀₁ °49	^s ₃₂ °69	^s ₅₃ °93
26	^s ₅₂ °59	^s ₄₅ °24	^s ₅₂ °64	^s ₅₄ °42	^s ₄₈ °68	^s ₆₁ °64	^s ₄₂ °55	^s ₀₄ °30	^s ₃₆ °30	^s ₀₁ °27	^s ₃₂ °66	^s ₅₃ °62
27	^s ₅₂ °68	^s ₄₅ °50	^s ₅₂ °58	^s ₅₄ °74	^s ₄₈ °47	^s ₆₁ °81	^s ₄₂ °31	^s ₀₄ °28	^s ₃₆ °16	^s ₀₁ °05	^s ₃₂ °62	^s ₅₃ °33
28	^s ₅₂ °77	^s ₄₅ °77	^s ₅₂ °50	^s ₅₅ °05	^s ₄₈ °25	^s ₆₁ °97	^s ₄₂ °08	^s ₀₄ °23	^s ₃₆ °02	^s ₀₀ °85	^s ₃₂ °58	^s ₅₃ °05
29	^s ₅₂ °86	^s ₄₆ °06	^s ₅₂ °40	^s ₅₅ °36	^s ₄₈ °04	^s ₆₂ °11	^s ₄₁ °87	^s ₀₄ °18	^s ₃₅ °89	^s ₀₀ °66	^s ₃₂ °53	^s ₅₂ °76
30	^s ₅₂ °94 ^s ₅₃ °00	^s ₄₆ °37 ^s ₄₆ °70	^s ₅₂ °29	^s ₅₅ °64	^s ₄₇ °83	^s ₆₂ °24	^s ₄₁ °67	^s ₀₄ °13	^s ₃₅ °76	^s ₀₀ °48	^s ₃₂ °47	^s ₅₂ °48
31	^s ₅₃ °04	^s ₄₇ °03	^s ₅₂ °16	^s ₅₅ °91	^s ₄₇ °63	^s ₆₂ °35	^s ₄₁ °48	^s ₀₄ °08	^s ₃₅ °62	^s ₀₀ °32	^s ₃₂ °39	^s ₅₂ °19
32	^s ₅₃ °07	^s ₄₇ °35	^s ₅₂ °03	^s ₅₆ °18			^s ₄₁ °30	^s ₀₄ °03			^s ₃₂ °31	^s ₅₁ °87

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

 ν Octantis. Mag. 5.74

Day.	JANUARY.		FEBRUARY.		MARCH.		APRIL.		MAY.		JUNE.	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ₂₂ ^m ₁₈	[°] ₈₆ ['] ₁₉	^h ₂₂ ^m ₁₈	[°] ₈₆ ['] ₁₉	^h ₂₂ ^m ₁₈	[°] ₈₆ ['] ₁₉	^h ₂₂ ^m ₁₈	[°] ₈₆ ['] ₁₈	^h ₂₂ ^m ₁₉	[°] ₈₆ ['] ₁₈	^h ₂₂ ^m ₁₉	[°] ₈₆ ['] ₁₈
1	^s _{52.52}	^s _{35.71}	^s _{47.99}	^s _{25.75}	^s _{48.29}	^s _{15.10}	^s _{53.42}	^s _{63.90}	^s _{01.84}	^s _{55.63}	^s _{12.60}	^s _{51.18}
2	^s _{52.29}	^s _{35.42}	^s _{47.98}	^s _{25.38}	^s _{48.44}	^s _{14.72}	^s _{53.64}	^s _{63.62}	^s _{02.12}	^s _{55.40}	^s _{12.97}	^s _{51.08}
3	^s _{52.08}	^s _{35.11}	^s _{47.97}	^s _{25.02}	^s _{48.58}	^s _{14.36}	^s _{53.83}	^s _{63.31}	^s _{02.40}	^s _{55.16}	^s _{13.37}	^s _{50.99}
4	^s _{51.91}	^s _{34.79}	^s _{47.96}	^s _{24.68}	^s _{48.70}	^s _{14.01}	^s _{54.02}	^s _{62.98}	^s _{02.71}	^s _{54.92}	^s _{13.77}	^s _{50.92}
5	^s _{51.76}	^s _{34.50}	^s _{47.92}	^s _{24.35}	^s _{48.80}	^s _{13.66}	^s _{54.21}	^s _{62.64}	^s _{03.05}	^s _{54.67}	^s _{14.18}	^s _{50.87}
6	^s _{51.62}	^s _{34.22}	^s _{47.87}	^s _{24.01}	^s _{48.88}	^s _{13.31}	^s _{54.43}	^s _{62.28}	^s _{03.41}	^s _{54.43}	^s _{14.58}	^s _{50.85}
7	^s _{51.48}	^s _{33.96}	^s _{47.79}	^s _{23.65}	^s _{48.95}	^s _{12.94}	^s _{54.68}	^s _{61.93}	^s _{03.80}	^s _{54.22}	^s _{14.97}	^s _{50.86}
8	^s _{51.30}	^s _{33.72}	^s _{47.71}	^s _{23.28}	^s _{49.02}	^s _{12.56}	^s _{54.94}	^s _{61.58}	^s _{04.19}	^s _{54.03}	^s _{15.33}	^s _{50.88}
9	^s _{51.11}	^s _{33.47}	^s _{47.64}	^s _{22.89}	^s _{49.09}	^s _{12.16}	^s _{55.23}	^s _{61.25}	^s _{04.57}	^s _{53.85}	^s _{15.68}	^s _{50.90}
10	^s _{50.91}	^s _{33.21}	^s _{47.58}	^s _{22.49}	^s _{49.20}	^s _{11.75}	^s _{55.53}	^s _{60.93}	^s _{04.94}	^s _{53.70}	^s _{16.01}	^s _{50.93}
11	^s _{50.68}	^s _{32.93}	^s _{47.54}	^s _{22.07}	^s _{49.33}	^s _{11.33}	^s _{55.84}	^s _{60.63}	^s _{05.31}	^s _{53.57}	^s _{16.32}	^s _{50.94}
12	^s _{50.44}	^s _{32.63}	^s _{47.53}	^s _{21.65}	^s _{49.48}	^s _{10.91}	^s _{56.15}	^s _{60.35}	^s _{05.66}	^s _{53.45}	^s _{16.63}	^s _{50.95}
13	^s _{50.22}	^s _{32.32}	^s _{47.55}	^s _{21.25}	^s _{49.66}	^s _{10.51}	^s _{56.46}	^s _{60.08}	^s _{05.99}	^s _{53.33}	^s _{16.93}	^s _{50.94}
14	^s _{50.03}	^s _{31.97}	^s _{47.59}	^s _{20.85}	^s _{49.85}	^s _{10.13}	^s _{56.75}	^s _{59.83}	^s _{06.31}	^s _{53.20}	^s _{17.25}	^s _{50.93}
15	^s _{49.86}	^s _{31.62}	^s _{47.65}	^s _{20.47}	^s _{50.04}	^s _{09.77}	^s _{57.02}	^s _{59.58}	^s _{06.61}	^s _{53.07}	^s _{17.59}	^s _{50.91}
16	^s _{49.71}	^s _{31.26}	^s _{47.70}	^s _{20.09}	^s _{50.24}	^s _{09.43}	^s _{57.28}	^s _{59.34}	^s _{06.91}	^s _{52.92}	^s _{17.95}	^s _{50.88}
17	^s _{49.59}	^s _{30.91}	^s _{47.75}	^s _{19.74}	^s _{50.42}	^s _{09.10}	^s _{57.53}	^s _{59.10}	^s _{07.21}	^s _{52.77}	^s _{18.32}	^s _{50.87}
18	^s _{49.48}	^s _{30.58}	^s _{47.78}	^s _{19.40}	^s _{50.59}	^s _{08.78}	^s _{57.77}	^s _{58.84}	^s _{07.54}	^s _{52.60}	^s _{18.72}	^s _{50.88}
19	^s _{49.39}	^s _{30.25}	^s _{47.81}	^s _{19.05}	^s _{50.75}	^s _{08.45}	^s _{58.01}	^s _{58.57}	^s _{07.89}	^s _{52.43}	^s _{19.12}	^s _{50.91}
20	^s _{49.30}	^s _{29.93}	^s _{47.83}	^s _{18.70}	^s _{50.90}	^s _{08.12}	^s _{58.27}	^s _{58.28}	^s _{08.25}	^s _{52.27}	^s _{19.52}	^s _{50.97}
21	^s _{49.19}	^s _{29.63}	^s _{47.84}	^s _{18.34}	^s _{51.04}	^s _{07.78}	^s _{58.55}	^s _{57.98}	^s _{08.65}	^s _{52.11}	^s _{19.90}	^s _{51.05}
22	^s _{49.08}	^s _{29.33}	^s _{47.83}	^s _{17.98}	^s _{51.17}	^s _{07.43}	^s _{58.86}	^s _{57.68}	^s _{09.07}	^s _{51.97}	^s _{20.25}	^s _{51.13}
23	^s _{48.95}	^s _{29.03}	^s _{47.83}	^s _{17.59}	^s _{51.31}	^s _{07.06}	^s _{59.18}	^s _{57.38}	^s _{09.49}	^s _{51.86}	^s _{20.58}	^s _{51.22}
24	^s _{48.81}	^s _{28.72}	^s _{47.84}	^s _{17.18}	^s _{51.47}	^s _{06.69}	^s _{59.53}	^s _{57.10}	^s _{09.90}	^s _{51.77}	^s _{20.87}	^s _{51.30}
25	^s _{48.66}	^s _{28.41}	^s _{47.88}	^s _{16.76}	^s _{51.66}	^s _{06.29}	^s _{59.90}	^s _{56.85}	^s _{10.28}	^s _{51.71}	^s _{21.15}	^s _{51.38}
26	^s _{48.51}	^s _{28.07}	^s _{47.94}	^s _{16.33}	^s _{51.87}	^s _{05.89}	^s _{60.28}	^s _{56.62}	^s _{10.64}	^s _{51.67}	^s _{21.43}	^s _{51.44}
27	^s _{48.37}	^s _{27.71}	^s _{48.02}	^s _{15.90}	^s _{52.11}	^s _{05.52}	^s _{60.63}	^s _{56.41}	^s _{10.98}	^s _{51.63}	^s _{21.72}	^s _{51.49}
28	^s _{48.23}	^s _{27.33}	^s _{48.15}	^s _{15.49}	^s _{52.37}	^s _{05.16}	^s _{60.96}	^s _{56.22}	^s _{11.29}	^s _{51.56}	^s _{22.03}	^s _{51.53}
29	^s _{48.12}	^s _{26.93}	^s _{48.29}	^s _{15.10}	^s _{52.65}	^s _{04.82}	^s _{61.27}	^s _{56.03}	^s _{11.60}	^s _{51.48}	^s _{22.36}	^s _{51.57}
30	^s _{48.04}	^s _{26.53}			^s _{52.92}	^s _{04.50}	^s _{61.56}	^s _{55.84}	^s _{11.92}	^s _{51.39}	^s _{22.70}	^s _{51.63}
31	^s _{48.00}	^s _{26.13}			^s _{53.18}	^s _{04.19}	^s _{61.84}	^s _{55.63}	^s _{12.25}	^s _{51.29}	^s _{23.07}	^s _{51.71}
32	^s _{47.99}	^s _{25.75}			^s _{53.42}	^s _{03.90}			^s _{12.60}	^s _{51.18}		

Mean R.A. $22^{\text{h}} 18^{\text{m}} 58^{\text{s}}.363$ Mean Dec. $-86^{\circ} 19' 13''.50$ Sec δ 15.58 Tan δ -15.55

AT UPPER TRANSIT AT GREENWICH.

v Octantis. Mag. 5.74

Day.	JULY.		AUGUST.		SEPTEMBER.		OCTOBER.		NOVEMBER.		DECEMBER.	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ₂₂ ^m ₁₉	[°] ₈₆ ['] ₁₈	^h ₂₂ ^m ₁₉	[°] ₈₆ ['] ₁₈	^h ₂₂ ^m ₁₉	[°] ₈₆ ['] ₁₉	^h ₂₂ ^m ₁₉	[°] ₈₆ ['] ₁₉	^h ₂₂ ^m ₁₉	[°] ₈₆ ['] ₁₉	^h ₂₂ ^m ₁₉	[°] ₈₆ ['] ₁₉
1	^s ₂₃ ·07	["] ₅₁ ·71	^s ₃₁ ·36	["] ₅₇ ·15	^s ₃₄ ·58	["] ₀₆ ·08	^s ₃₁ ·96	["] ₁₄ ·60	^s ₂₄ ·52	["] ₂₀ ·37	^s ₁₅ ·17	["] ₂₀ ·97
2	^s ₂₃ ·44	["] ₅₁ ·82	^s ₃₁ ·55	["] ₅₇ ·43	^s ₃₄ ·53	["] ₀₆ ·37	^s ₃₁ ·77	["] ₁₄ ·81	^s ₂₄ ·28	["] ₂₀ ·48	^s ₁₄ ·87	["] ₂₀ ·93
3	^s ₂₃ ·80	["] ₅₁ ·95	^s ₃₁ ·72	["] ₅₇ ·71	^s ₃₄ ·49	["] ₀₆ ·65	^s ₃₁ ·60	["] ₁₅ ·02	^s ₂₄ ·03	["] ₂₀ ·59	^s ₁₄ ·56	["] ₂₀ ·88
4	^s ₂₄ ·14	["] ₅₂ ·09	^s ₃₁ ·87	["] ₅₇ ·99	^s ₃₄ ·46	["] ₀₆ ·91	^s ₃₁ ·46	["] ₁₅ ·24	^s ₂₃ ·76	["] ₂₀ ·72	^s ₁₄ ·21	["] ₂₀ ·83
5	^s ₂₄ ·46	["] ₅₂ ·24	^s ₃₁ ·99	["] ₅₈ ·26	^s ₃₄ ·45	["] ₀₇ ·17	^s ₃₁ ·32	["] ₁₅ ·48	^s ₂₃ ·47	["] ₂₀ ·85	^s ₁₃ ·85	["] ₂₀ ·76
6	^s ₂₄ ·76	["] ₅₂ ·40	^s ₃₂ ·11	["] ₅₈ ·52	^s ₃₄ ·45	["] ₀₇ ·43	^s ₃₁ ·19	["] ₁₅ ·73	^s ₂₃ ·15	["] ₂₀ ·97	^s ₁₃ ·48	["] ₂₀ ·65
7	^s ₂₅ ·04	["] ₅₂ ·57	^s ₃₂ ·23	["] ₅₈ ·76	^s ₃₄ ·47	["] ₀₇ ·70	^s ₃₁ ·04	["] ₁₅ ·98	^s ₂₂ ·80	["] ₂₁ ·07	^s ₁₃ ·13	["] ₂₀ ·50
8	^s ₂₅ ·30	["] ₅₂ ·73	^s ₃₂ ·36	["] ₅₈ ·98	^s ₃₄ ·50	["] ₀₇ ·99	^s ₃₀ ·85	["] ₁₆ ·25	^s ₂₂ ·44	["] ₂₁ ·16	^s ₁₂ ·80	["] ₂₀ ·33
9	^s ₂₅ ·54	["] ₅₂ ·88	^s ₃₂ ·51	["] ₅₉ ·20	^s ₃₄ ·51	["] ₀₈ ·30	^s ₃₀ ·64	["] ₁₆ ·52	^s ₂₂ ·08	["] ₂₁ ·22	^s ₁₂ ·50	["] ₂₀ ·16
10	^s ₂₅ ·78	["] ₅₃ ·02	^s ₃₂ ·67	["] ₅₉ ·42	^s ₃₄ ·51	["] ₀₈ ·63	^s ₃₀ ·41	["] ₁₆ ·78	^s ₂₁ ·72	["] ₂₁ ·25	^s ₁₂ ·22	["] ₁₉ ·98
11	^s ₂₆ ·03	["] ₅₃ ·15	^s ₃₂ ·84	["] ₅₉ ·65	^s ₃₄ ·48	["] ₀₈ ·97	^s ₃₀ ·15	["] ₁₇ ·01	^s ₂₁ ·39	["] ₂₁ ·25	^s ₁₁ ·96	["] ₁₉ ·81
12	^s ₂₆ ·30	["] ₅₃ ·27	^s ₃₃ ·03	["] ₅₉ ·90	^s ₃₄ ·42	["] ₀₉ ·30	^s ₂₉ ·87	["] ₁₇ ·22	^s ₂₁ ·08	["] ₂₁ ·25	^s ₁₁ ·71	["] ₁₉ ·65
13	^s ₂₆ ·58	["] ₅₃ ·39	^s ₃₃ ·22	["] ₆₀ ·17	^s ₃₄ ·33	["] ₀₉ ·63	^s ₂₉ ·59	["] ₁₇ ·41	^s ₂₀ ·79	["] ₂₁ ·25	^s ₁₁ ·46	["] ₁₉ ·51
14	^s ₂₆ ·88	["] ₅₃ ·51	^s ₃₃ ·40	["] ₆₀ ·45	^s ₃₄ ·21	["] ₀₉ ·93	^s ₂₉ ·34	["] ₁₇ ·57	^s ₂₀ ·51	["] ₂₁ ·27	^s ₁₁ ·21	["] ₁₉ ·39
15	^s ₂₇ ·19	["] ₅₃ ·64	^s ₃₃ ·55	["] ₆₀ ·76	^s ₃₄ ·08	["] ₁₀ ·21	^s ₂₉ ·09	["] ₁₇ ·72	^s ₂₀ ·24	["] ₂₁ ·30	^s ₁₀ ·94	["] ₁₉ ·27
16	^s ₂₇ ·51	["] ₅₃ ·80	^s ₃₃ ·68	["] ₆₁ ·07	^s ₃₃ ·95	["] ₁₀ ·47	^s ₂₈ ·86	["] ₁₇ ·87	^s ₁₉ ·97	["] ₂₁ ·33	^s ₁₀ ·65	["] ₁₉ ·15
17	^s ₂₇ ·84	["] ₅₃ ·98	^s ₃₃ ·78	["] ₆₁ ·39	^s ₃₃ ·84	["] ₁₀ ·71	^s ₂₈ ·65	["] ₁₈ ·03	^s ₁₉ ·68	["] ₂₁ ·38	^s ₁₀ ·35	["] ₁₉ ·02
18	^s ₂₈ ·15	["] ₅₄ ·18	^s ₃₃ ·84	["] ₆₁ ·69	^s ₃₃ ·75	["] ₁₀ ·95	^s ₂₈ ·44	["] ₁₈ ·20	^s ₁₉ ·37	["] ₂₁ ·43	^s ₁₀ ·03	["] ₁₈ ·87
19	^s ₂₈ ·43	["] ₅₄ ·40	^s ₃₃ ·89	["] ₆₁ ·98	^s ₃₃ ·67	["] ₁₁ ·20	^s ₂₈ ·24	["] ₁₈ ·39	^s ₁₉ ·04	["] ₂₁ ·47	^s ₀₉ ·71	["] ₁₈ ·71
20	^s ₂₈ ·68	["] ₅₄ ·64	^s ₃₃ ·93	["] ₆₂ ·26	^s ₃₃ ·60	["] ₁₁ ·46	^s ₂₈ ·02	["] ₁₈ ·59	^s ₁₈ ·69	["] ₂₁ ·51	^s ₀₉ ·38	["] ₁₈ ·52
21	^s ₂₈ ·90	["] ₅₄ ·87	^s ₃₃ ·96	["] ₆₂ ·50	^s ₃₃ ·54	["] ₁₁ ·74	^s ₂₇ ·78	["] ₁₈ ·80	^s ₁₈ ·32	["] ₂₁ ·53	^s ₀₉ ·07	["] ₁₈ ·31
22	^s ₂₉ ·09	["] ₅₅ ·08	^s ₃₄ ·03	["] ₆₂ ·73	^s ₃₃ ·47	["] ₁₂ ·04	^s ₂₇ ·51	["] ₁₉ ·01	^s ₁₇ ·96	["] ₂₁ ·53	^s ₀₈ ·77	["] ₁₈ ·09
23	^s ₂₉ ·27	["] ₅₅ ·27	^s ₃₄ ·11	["] ₆₂ ·97	^s ₃₃ ·38	["] ₁₂ ·34	^s ₂₇ ·23	["] ₁₉ ·22	^s ₁₇ ·59	["] ₂₁ ·51	^s ₀₈ ·50	["] ₁₇ ·84
24	^s ₂₉ ·46	["] ₅₅ ·45	^s ₃₄ ·21	["] ₆₃ ·23	^s ₃₃ ·26	["] ₁₂ ·66	^s ₂₆ ·93	["] ₁₉ ·42	^s ₁₇ ·22	["] ₂₁ ·46	^s ₀₈ ·25	["] ₁₇ ·59
25	^s ₂₉ ·67	["] ₅₅ ·62	^s ₃₄ ·32	["] ₆₃ ·52	^s ₃₃ ·12	["] ₁₂ ·97	^s ₂₆ ·60	["] ₁₉ ·60	^s ₁₆ ·87	["] ₂₁ ·40	^s ₀₈ ·02	["] ₁₇ ·34
26	^s ₂₉ ·90	["] ₅₅ ·78	^s ₃₄ ·43	["] ₆₃ ·81	^s ₃₂ ·96	["] ₁₃ ·28	^s ₂₆ ·27	["] ₁₉ ·76	^s ₁₆ ·55	["] ₂₁ ·32	^s ₀₇ ·82	["] ₁₇ ·10
27	^s ₃₀ ·14	["] ₅₅ ·96	^s ₃₄ ·52 ₃₄ ·58	["] ₆₄ ·12 ₆₄ ·44	^s ₃₂ ·77	["] ₁₃ ·58	^s ₂₅ ·95	["] ₁₉ ·90	^s ₁₆ ·25	["] ₂₁ ·23	^s ₀₇ ·62	["] ₁₆ ·87
28	^s ₃₀ ·39	["] ₅₆ ·15	^s ₃₄ ·63	["] ₆₄ ·78	^s ₃₂ ·57	["] ₁₃ ·86	^s ₂₅ ·63	["] ₂₀ ·02	^s ₁₅ ·97	["] ₂₁ ·15	^s ₀₇ ·42	["] ₁₆ ·66
29	^s ₃₀ ·64	["] ₅₆ ·37	^s ₃₄ ·65	["] ₆₅ ·12	^s ₃₂ ·36	["] ₁₄ ·12	^s ₂₅ ·33	["] ₂₀ ·11	^s ₁₅ ·70	["] ₂₁ ·08	^s ₀₇ ·21	["] ₁₆ ·45
30	^s ₃₀ ·90	["] ₅₆ ·61	^s ₃₄ ·64	["] ₆₅ ·46	^s ₃₂ ·16	["] ₁₄ ·37	^s ₂₅ ·04	["] ₂₀ ·19	^s ₁₅ ·43	["] ₂₁ ·02	^s ₀₆ ·98	["] ₁₆ ·25
31	^s ₃₁ ·14	["] ₅₆ ·87	^s ₃₄ ·62	["] ₆₅ ·78	^s ₃₁ ·96	["] ₁₄ ·60	^s ₂₄ ·77	["] ₂₀ ·28	^s ₁₅ ·17	["] ₂₀ ·97	^s ₀₆ ·74	["] ₁₆ ·04
32	^s ₃₁ ·36	["] ₅₇ ·15	^s ₃₄ ·58	["] ₆₆ ·08			^s ₂₄ ·52	["] ₂₀ ·37			^s ₀₆ ·47	["] ₁₅ ·80

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

 β Octantis. Mag. 4.34

Day.	JANUARY.		FEBRUARY.		MARCH.		APRIL.		MAY.		JUNE.	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ₂₂ ^m ₃₉ ^s ₈₁ [°] ₄₄	—	^h ₂₂ ^m ₃₉ ^s ₈₁ [°] ₄₄	—	^h ₂₂ ^m ₃₉ ^s ₈₁ [°] ₄₄	—	^h ₂₂ ^m ₃₉ ^s ₈₁ [°] ₄₄	—	^h ₂₂ ^m ₃₉ ^s ₈₁ [°] ₄₄	—	^h ₂₂ ^m ₃₉ ^s ₈₁ [°] ₄₄	—
I	05 ^s .26	61 ^s .50	03 ^s .02	52 ^s .38	02 ^s .84	42 ^s .01	04 ^s .78	30 ^s .57	08 ^s .32	21 ^s .58	13 ^s .11	16 ^s .00
2	05 ^s .16	61 ^s .24	03 ^s .01	52 ^s .02	02 ^s .90	41 ^s .63	04 ^s .86	30 ^s .26	08 ^s .43	21 ^s .32	13 ^s .29	15 ^s .87
3	05 ^s .07	60 ^s .96	03 ^s .00	51 ^s .67	02 ^s .95	41 ^s .26	04 ^s .94	29 ^s .95	08 ^s .56	21 ^s .04	13 ^s .47	15 ^s .74
4	04 ^s .99	60 ^s .68	02 ^s .99	51 ^s .34	02 ^s .99	40 ^s .92	05 ^s .02	29 ^s .62	08 ^s .70	20 ^s .76	13 ^s .66	15 ^s .64
5	04 ^s .92	60 ^s .42	02 ^s .96	51 ^s .02	03 ^s .01	40 ^s .58	05 ^s .10	29 ^s .27	08 ^s .85	20 ^s .48	13 ^s .84	15 ^s .55
6	04 ^s .85	60 ^s .17	02 ^s .92	50 ^s .71	03 ^s .04	40 ^s .22	05 ^s .18	28 ^s .89	09 ^s .01	20 ^s .21	14 ^s .03	15 ^s .49
7	04 ^s .78	59 ^s .93	02 ^s .87	50 ^s .40	03 ^s .06	39 ^s .86	05 ^s .27	28 ^s .51	09 ^s .18	19 ^s .97	14 ^s .21	15 ^s .46
8	04 ^s .70	59 ^s .72	02 ^s .83	50 ^s .05	03 ^s .07	39 ^s .48	05 ^s .39	28 ^s .14	09 ^s .35	19 ^s .74	14 ^s .37	15 ^s .44
9	04 ^s .61	59 ^s .51	02 ^s .78	49 ^s .67	03 ^s .10	39 ^s .08	05 ^s .52	27 ^s .78	09 ^s .52	19 ^s .53	14 ^s .53	15 ^s .43
10	04 ^s .50	59 ^s .29	02 ^s .74	49 ^s .27	03 ^s .13	38 ^s .66	05 ^s .65	27 ^s .43	09 ^s .68	19 ^s .34	14 ^s .68	15 ^s .41
11	04 ^s .39	59 ^s .04	02 ^s .72	48 ^s .87	03 ^s .18	38 ^s .24	05 ^s .78	27 ^s .11	09 ^s .84	19 ^s .16	14 ^s .83	15 ^s .38
12	04 ^s .27	58 ^s .77	02 ^s .70	48 ^s .46	03 ^s .24	37 ^s .83	05 ^s .91	26 ^s .81	09 ^s .99	19 ^s .00	14 ^s .96	15 ^s .34
13	04 ^s .17	58 ^s .48	02 ^s .70	48 ^s .06	03 ^s .30	37 ^s .42	06 ^s .03	26 ^s .53	10 ^s .14	18 ^s .84	15 ^s .11	15 ^s .30
14	04 ^s .08	58 ^s .15	02 ^s .71	47 ^s .66	03 ^s .38	37 ^s .03	06 ^s .15	26 ^s .26	10 ^s .27	18 ^s .69	15 ^s .26	15 ^s .25
15	04 ^s .00	57 ^s .82	02 ^s .72	47 ^s .29	03 ^s .46	36 ^s .65	06 ^s .27	25 ^s .99	10 ^s .41	18 ^s .52	15 ^s .41	15 ^s .19
16	03 ^s .93	57 ^s .49	02 ^s .73	46 ^s .93	03 ^s .54	36 ^s .29	06 ^s .38	25 ^s .72	10 ^s .54	18 ^s .35	15 ^s .58	15 ^s .12
17	03 ^s .87	57 ^s .18	02 ^s .74	46 ^s .59	03 ^s .61	35 ^s .95	06 ^s .48	25 ^s .44	10 ^s .68	18 ^s .16	15 ^s .76	15 ^s .06
18	03 ^s .82	56 ^s .88	02 ^s .75	46 ^s .24	03 ^s .67	35 ^s .62	06 ^s .57	25 ^s .15	10 ^s .82	17 ^s .97	15 ^s .95	15 ^s .03
19	03 ^s .77	56 ^s .58	02 ^s .75	45 ^s .90	03 ^s .72	35 ^s .29	06 ^s .67	24 ^s .85	10 ^s .98	17 ^s .76	16 ^s .14	15 ^s .02
20	03 ^s .72	56 ^s .28	02 ^s .74	45 ^s .57	03 ^s .78	34 ^s .96	06 ^s .78	24 ^s .54	11 ^s .15	17 ^s .55	16 ^s .32	15 ^s .03
21	03 ^s .66	56 ^s .00	02 ^s .73	45 ^s .23	03 ^s .83	34 ^s .61	06 ^s .90	24 ^s .22	11 ^s .33	17 ^s .35	16 ^s .50	15 ^s .06
22	03 ^s .60	55 ^s .73	02 ^s .71	44 ^s .87	03 ^s .87	34 ^s .25	07 ^s .03	23 ^s .90	11 ^s .52	17 ^s .18	16 ^s .67	15 ^s .12
23	03 ^s .53	55 ^s .45	02 ^s .70	44 ^s .49	03 ^s .92	33 ^s .88	07 ^s .17	23 ^s .58	11 ^s .71	17 ^s .03	16 ^s .82	15 ^s .18
24	03 ^s .46	55 ^s .17	02 ^s .69	44 ^s .10	03 ^s .98	33 ^s .50	07 ^s .32	23 ^s .26	11 ^s .89	16 ^s .91	16 ^s .96	15 ^s .24
25	03 ^s .38	54 ^s .88	02 ^s .70	43 ^s .68	04 ^s .05	33 ^s .09	07 ^s .48	22 ^s .97	12 ^s .06	16 ^s .81	17 ^s .09	15 ^s .28
26	03 ^s .30	54 ^s .56	02 ^s .72	43 ^s .26	04 ^s .14	32 ^s .69	07 ^s .64	22 ^s .70	12 ^s .23	16 ^s .71	17 ^s .23	15 ^s .30
27	03 ^s .23	54 ^s .23	02 ^s .75	42 ^s .83	04 ^s .24	32 ^s .29	07 ^s .80	22 ^s .45	12 ^s .38	16 ^s .62	17 ^s .36	15 ^s .31
28	03 ^s .16	53 ^s .88	02 ^s .79	42 ^s .41	04 ^s .35	31 ^s .91	07 ^s .94	22 ^s .23	12 ^s .52	16 ^s .52	17 ^s .51	15 ^s .31
29	03 ^s .10	53 ^s .50	02 ^s .84	42 ^s .01	04 ^s .47	31 ^s .54	08 ^s .08	22 ^s .03	12 ^s .66	16 ^s .40	17 ^s .66	15 ^s .32
30	03 ^s .06	53 ^s .12			04 ^s .59	31 ^s .19	08 ^s .20	21 ^s .82	12 ^s .80	16 ^s .27	17 ^s .84	15 ^s .33
31	03 ^s .04	52 ^s .75			04 ^s .69	30 ^s .87	08 ^s .32	21 ^s .58	12 ^s .95	16 ^s .14	18 ^s .02	15 ^s .37
32	03 ^s .02	52 ^s .38			04 ^s .78	30 ^s .57			13 ^s .11	16 ^s .00		

Mean R.A. 22^h 39^m 07^s.169 Mean Dec. -81° 44' 38".95 Sec δ 6.96 Tan δ -6.89

AT UPPER TRANSIT AT GREENWICH.

 β Octantis. Mag. 4.34

Day.	JULY.		AUGUST.		SEPTEMBER.		OCTOBER.		NOVEMBER.		DECEMBER.	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ^m ^s 22 39 81 44	—	^h ^m ^s 22 39 81 44	—	^h ^m ^s 22 39 81 44	—	^h ^m ^s 22 39 81 44	—	^h ^m ^s 22 39 81 44	—	^h ^m ^s 22 39 81 44	—
1	18 ^s 02	15 ^s 37	22 ^s 11	19 ^s 77	^s _{24.05}	^s _{27.85} 28 ^s 45	23 ^s 34	36 ^s 73	20 ^s 39	43 ^s 19	16 ^s 41	44 ^s 84
2	18 ^s 20	15 ^s 42	22 ^s 21	20 ^s 02	24 ^s 05	28 ^s 45	23 ^s 27	36 ^s 96	20 ^s 30	43 ^s 31	16 ^s 28	44 ^s 84
3	18 ^s 37	15 ^s 50	22 ^s 30	20 ^s 27	24 ^s 05	28 ^s 72	23 ^s 20	37 ^s 19	20 ^s 19	43 ^s 45	16 ^s 15	44 ^s 83
4	18 ^s 53	15 ^s 61	22 ^s 38	20 ^s 53	24 ^s 05	28 ^s 98	23 ^s 15	37 ^s 41	20 ^s 09	43 ^s 62	15 ^s 99	44 ^s 81
5	18 ^s 67	15 ^s 73	22 ^s 45	20 ^s 78	24 ^s 06	29 ^s 23	23 ^s 11	37 ^s 64	19 ^s 96	43 ^s 79	15 ^s 83	44 ^s 77
6	18 ^s 82	15 ^s 86	22 ^s 52	21 ^s 02	24 ^s 08	29 ^s 48	23 ^s 07	37 ^s 89	19 ^s 82	43 ^s 95	15 ^s 67	44 ^s 70
7	18 ^s 96	16 ^s 00	22 ^s 59	21 ^s 25	24 ^s 10	29 ^s 74	23 ^s 02	38 ^s 17	19 ^s 67	44 ^s 09	15 ^s 51	44 ^s 61
8	19 ^s 09	16 ^s 13	22 ^s 67	21 ^s 46	24 ^s 13	30 ^s 02	22 ^s 95	38 ^s 46	19 ^s 52	44 ^s 21	15 ^s 37	44 ^s 49
9	19 ^s 20	16 ^s 25	22 ^s 75	21 ^s 66	24 ^s 16	30 ^s 32	22 ^s 87	38 ^s 74	19 ^s 37	44 ^s 30	15 ^s 23	44 ^s 36
10	19 ^s 32	16 ^s 37	22 ^s 83	21 ^s 84	24 ^s 18	30 ^s 63	22 ^s 78	39 ^s 02	19 ^s 22	44 ^s 36	15 ^s 11	44 ^s 22
11	19 ^s 44	16 ^s 47	22 ^s 93	22 ^s 03	24 ^s 18	30 ^s 97	22 ^s 67	39 ^s 28	19 ^s 07	44 ^s 41	15 ^s 00	44 ^s 09
12	19 ^s 57	16 ^s 56	23 ^s 04	22 ^s 26	24 ^s 16	31 ^s 30	22 ^s 55	39 ^s 52	18 ^s 95	44 ^s 45	14 ^s 90	43 ^s 98
13	19 ^s 71	16 ^s 64	23 ^s 13	22 ^s 50	24 ^s 13	31 ^s 63	22 ^s 44	39 ^s 73	18 ^s 84	44 ^s 49	14 ^s 79	43 ^s 87
14	19 ^s 86	16 ^s 72	23 ^s 22	22 ^s 76	24 ^s 09	31 ^s 93	22 ^s 33	39 ^s 92	18 ^s 72	44 ^s 54	14 ^s 67	43 ^s 77
15	20 ^s 01	16 ^s 81	23 ^s 31	23 ^s 04	24 ^s 04	32 ^s 22	22 ^s 24	40 ^s 09	18 ^s 60	44 ^s 60	14 ^s 55	43 ^s 67
16	20 ^s 17	16 ^s 93	23 ^s 39	23 ^s 34	24 ^s 00	32 ^s 49	22 ^s 15	40 ^s 26	18 ^s 49	44 ^s 67	14 ^s 43	43 ^s 59
17	20 ^s 33	17 ^s 07	23 ^s 44	23 ^s 65	23 ^s 96	32 ^s 73	22 ^s 07	40 ^s 44	18 ^s 37	44 ^s 74	14 ^s 29	43 ^s 50
18	20 ^s 48	17 ^s 24	23 ^s 48	23 ^s 94	23 ^s 95	32 ^s 97	22 ^s 00	40 ^s 64	18 ^s 23	44 ^s 82	14 ^s 14	43 ^s 41
19	20 ^s 62	17 ^s 43	23 ^s 51	24 ^s 21	23 ^s 93	33 ^s 22	21 ^s 92	40 ^s 86	18 ^s 08	44 ^s 90	13 ^s 99	43 ^s 29
20	20 ^s 75	17 ^s 62	23 ^s 55	24 ^s 47	23 ^s 92	33 ^s 48	21 ^s 84	41 ^s 08	17 ^s 94	44 ^s 98	13 ^s 85	43 ^s 14
21	20 ^s 86	17 ^s 82	23 ^s 59	24 ^s 71	23 ^s 90	33 ^s 75	21 ^s 74	41 ^s 31	17 ^s 78	45 ^s 05	13 ^s 71	42 ^s 96
22	20 ^s 95	18 ^s 01	23 ^s 63	24 ^s 94	23 ^s 88	34 ^s 05	21 ^s 63	41 ^s 55	17 ^s 61	45 ^s 09	13 ^s 57	42 ^s 77
23	21 ^s 04	18 ^s 18	23 ^s 69	25 ^s 18	23 ^s 86	34 ^s 37	21 ^s 52	41 ^s 78	17 ^s 45	45 ^s 10	13 ^s 45	42 ^s 57
24	21 ^s 14	18 ^s 33	23 ^s 75	25 ^s 42	23 ^s 83	34 ^s 69	21 ^s 39	42 ^s 01	17 ^s 29	45 ^s 09	13 ^s 34	42 ^s 35
25	21 ^s 25	18 ^s 47	23 ^s 81	25 ^s 67	23 ^s 77	35 ^s 01	21 ^s 26	42 ^s 22	17 ^s 14	45 ^s 06	13 ^s 24	42 ^s 13
26	21 ^s 37	18 ^s 60	23 ^s 87	25 ^s 94	23 ^s 71	35 ^s 33	21 ^s 11	42 ^s 41	17 ^s 00	45 ^s 02	13 ^s 14	41 ^s 92
27	21 ^s 49	18 ^s 74	23 ^s 93	26 ^s 24	23 ^s 64	35 ^s 65	20 ^s 97	42 ^s 57	16 ^s 88	44 ^s 97	13 ^s 06	41 ^s 73
28	21 ^s 62	18 ^s 90	23 ^s 98	26 ^s 55	23 ^s 57	35 ^s 94	20 ^s 85	42 ^s 71	16 ^s 76	44 ^s 92	12 ^s 97	41 ^s 54
29	21 ^s 76	19 ^s 09	24 ^s 01	26 ^s 88	23 ^s 49	36 ^s 22	20 ^s 72	42 ^s 84	16 ^s 65	44 ^s 88	12 ^s 87	41 ^s 37
30	21 ^s 89	19 ^s 30	24 ^s 04	27 ^s 21	23 ^s 41	36 ^s 48	20 ^s 60	42 ^s 96	16 ^s 53	44 ^s 85	12 ^s 76	41 ^s 20
31	22 ^s 00	19 ^s 53	24 ^s 04	27 ^s 53	23 ^s 34	36 ^s 73	20 ^s 50	43 ^s 07	16 ^s 41	44 ^s 84	12 ^s 64	41 ^s 03
32	22 ^s 11	19 ^s 77	^s _{24.05}	^s _{27.85} 28 ^s 16			20 ^s 39	43 ^s 19			12 ^s 51	40 ^s 84

Catalogue Number 1417

Spectrum Fo

Name	2 Ceti		α Andromedæ		β Cassiopeiæ	
Mag. Spect.	4.62	Ao	2.15	Aop	2.42	F5
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 00 00	^m —17 42	^h 00 04	^m +28 42	^h 00 05	^m +58 45
Jan. 0.7	12.008 ^s	81.38 ^s	48.097 ^s	41.05 ^s	27.386 ^s	84.10 ^s
10.7	11.904 ¹⁰⁴	81.66 ²⁸	47.965 ¹³²	40.19 ⁸⁶	27.078 ³⁰⁸	83.45 ⁶⁵
20.7	11.808 ⁹⁶	81.72 ⁶	47.840 ¹²⁵	39.08 ¹¹¹	26.782 ²⁹⁶	82.27 ¹¹⁸
30.6	11.725 ⁸³	81.55 ¹⁷	47.727 ¹¹³	37.76 ¹³²	26.510 ²⁷²	80.62 ¹⁶⁵
Feb. 9.6	11.660 ⁶⁵	81.13 ⁴²	47.631 ⁹⁶	36.28 ¹⁴⁸	26.274 ²³⁶	78.58 ²⁰⁴
19.6	11.616 ⁴⁴	80.46 ⁶⁷	47.561 ⁷⁰	34.72 ¹⁵⁶	26.086 ¹⁸⁸	76.23 ²³⁵
Mar. 1.6	11.599 ¹⁷	79.55 ⁹¹	47.521 ⁴⁰	33.14 ¹⁵⁸	25.958 ¹²⁸	73.67 ²⁵⁶
11.5	11.612 ¹³	78.39 ¹¹⁶	47.517 ⁴	31.63 ¹⁵¹	25.899 ⁵⁹	71.01 ²⁶⁶
21.5	11.660 ⁴⁸	77.00 ¹³⁹	47.555 ³⁸	30.27 ¹³⁶	25.915 ¹⁶	68.37 ²⁶⁴
31.5	11.746 ⁸⁶	75.38 ¹⁶²	47.638 ⁸³	29.11 ¹¹⁶	26.011 ⁹⁶	65.86 ²⁵¹
Apr. 10.5	11.872 ¹²⁶	73.55 ¹⁸³	47.767 ¹²⁹	28.24 ⁸⁷	26.187 ¹⁷⁶	63.58 ²²⁸
20.4	12.038 ¹⁶⁶	71.55 ²⁰⁰	47.943 ¹⁷⁶	27.69 ⁵⁵	26.439 ²⁵²	61.63 ¹⁹⁵
30.4	12.243 ²⁰⁵	69.39 ²¹⁶	48.164 ²²¹	27.51 ¹⁸	26.763 ³²⁴	60.08 ¹⁵⁵
May 10.4	12.484 ²⁴¹	67.13 ²²⁶	48.425 ²⁶¹	27.72 ²¹	27.151 ³⁸⁸	58.99 ¹⁰⁹
20.3	12.758 ²⁷⁴	64.81 ²³²	48.721 ²⁹⁶	28.32 ⁶⁰	27.591 ⁴⁴⁰	58.41 ⁵⁸
30.3	13.058 ³⁰⁰	62.49 ²³²	49.044 ³²³	29.31 ⁹⁹	28.071 ⁴⁸⁰	58.35 ⁶
June 9.3	13.378 ³²⁰	60.21 ²²⁸	49.386 ³⁴²	30.66 ¹³⁵	28.577 ⁵⁰⁶	58.83 ⁴⁸
19.3	13.710 ³³²	58.03 ²¹⁸	49.738 ³⁵²	32.34 ¹⁶⁸	29.097 ⁵²⁰	59.82 ⁹⁹
29.2	14.045 ³³⁵	56.02 ²⁰¹	50.092 ³⁵⁴	34.32 ¹⁹⁸	29.615 ⁵¹⁸	61.32 ¹⁵⁰
July 9.2	14.376 ³³¹	54.21 ¹⁸¹	50.438 ³⁴⁶	36.52 ²²⁰	30.119 ⁵⁰⁴	63.26 ¹⁹⁴
19.2	14.693 ³¹⁷	52.65 ¹⁵⁶	50.768 ³³⁰	38.89 ²³⁷	30.597 ⁴⁷⁸	65.60 ²³⁴
29.2	14.989 ²⁹⁶	51.38 ¹²⁷	51.075 ³⁰⁷	41.39 ²⁵⁰	31.038 ⁴⁴¹	68.30 ²⁷⁰
Aug. 8.1	15.258 ²⁶⁹	50.42 ⁹⁶	51.351 ²⁷⁶	43.96 ²⁵⁷	31.433 ³⁹⁵	71.29 ²⁹⁹
18.1	15.493 ²³⁵	49.79 ⁶³	51.593 ²⁴²	46.54 ²⁵⁸	31.774 ³⁴¹	74.50 ³²¹
28.1	15.691 ¹⁹⁸	49.49 ³⁰	51.796 ²⁰³	49.07 ²⁵³	32.056 ²⁸²	77.86 ³³⁶
Sept. 7.0	15.849 ¹⁵⁸	49.51 ²	51.958 ¹⁶²	51.52 ²⁴⁵	32.276 ²²⁰	81.32 ³⁴⁶
17.0	15.965 ¹¹⁶	49.82 ³¹	52.079 ¹²¹	53.83 ²³¹	32.432 ¹⁵⁶	84.80 ³⁴⁸
26.9	16.040 ⁷⁵	50.40 ⁵⁸	52.159 ⁸⁰	55.98 ²¹⁵	32.524 ⁹²	88.23 ³⁴³
Oct. 6.9	16.077 ³⁷	51.19 ⁷⁹	52.200 ⁴¹	57.93 ¹⁹⁵	32.554 ³⁰	91.54 ³³¹
16.9	16.078 ¹	52.14 ⁹⁵	52.207 ⁷	59.63 ¹⁷⁰	32.524 ³⁰	94.67 ³¹³
26.9	16.049 ²⁹	53.21 ¹⁰⁷	52.183 ²⁴	61.08 ¹⁴⁵	32.439 ⁸⁵	97.55 ²⁸⁸
Nov. 5.9	15.993 ⁵⁶	54.32 ¹¹¹	52.131 ⁵²	62.26 ¹¹⁸	32.302 ¹³⁷	100.11 ²⁵⁶
15.9	15.917 ⁷⁶	55.42 ¹¹⁰	52.055 ⁷⁶	63.14 ⁸⁸	32.120 ¹⁸²	102.30 ²¹⁹
25.8	15.825 ⁹²	56.47 ¹⁰⁵	51.960 ⁹⁵	63.72 ⁵⁸	31.897 ²²³	104.07 ¹⁷⁷
Dec. 5.8	15.722 ¹⁰³	57.41 ⁹⁴	51.849 ¹¹¹	63.99 ²⁷	31.640 ²⁵⁷	105.35 ¹²⁸
15.8	15.613 ¹⁰⁹	58.20 ⁷⁹	51.727 ¹²²	63.93 ⁶	31.358 ²⁸²	106.11 ⁷⁶
25.7	15.503 ¹¹⁰	58.82 ⁶²	51.599 ¹²⁸	63.56 ³⁷	31.059 ²⁹⁹	106.34 ²³
35.7	15.395 ¹⁰⁸	59.23 ⁴¹	51.468 ¹³¹	62.88 ⁶⁸	30.753 ³⁰⁶	106.02 ³²
Mean Place	12.374	71.86	48.918	34.43	28.935	69.39
Sec δ , Tan δ	1.050	—0.320	1.140	+0.548	1.929	+1.649
a, a'	+3.1	+20.0	+3.1	+20.0	+3.1	+20.0
b, b'	—0.02	0.0	+0.04	0.0	+0.11	0.0
Authority and Catalogue No.	A.N.	1504	B.J.	3	B.J.	4

AT UPPER TRANSIT AT GREENWICH.

Name Mag. Spect.	γ Pegasi				ι Ceti				ζ Tucanæ			
	2.87		B2		3.75		K0		4.34		F8	
	R.A.		Dec.		R.A.		Dec.		R.A.		Dec.	
Mean Solar Date	h m 00 09		° ' " s +14 47		h m 00 15		° ' " s -9 11		h m 00 16		° ' " s -65 16	
Jan. 0.7	40.129	108	62.53	77	54.379	102	88.45	49	29.98	39	69.02	83
10.7	40.021	103	61.76	88	54.277	97	88.94	34	29.59	36	68.19	140
20.7	39.918	93	60.88	95	54.180	88	89.28	18	29.23	32	66.79	192
30.7	39.825	78	59.93	99	54.092	74	89.46	1	28.91	28	64.87	239
Feb. 9.6	39.747	58	58.94	96	54.018	55	89.45	20	28.63	22	62.48	279
19.6	39.689	31	57.98	89	53.963	31	89.25	41	28.41	15	59.69	314
Mar. 1.6	39.658	—	57.09	76	53.932	2	88.84	64	28.26	8	56.55	341
11.5	39.658	—	56.33	58	53.930	—	88.20	88	28.18	—	53.14	360
21.5	39.695	37	55.75	35	53.962	32	87.32	111	28.17	7	49.54	371
31.5	39.771	118	55.40	8	54.030	108	86.21	135	28.24	15	45.83	376
Apr. 10.5	39.889	160	55.32	22	54.138	149	84.86	157	28.39	23	42.07	371
20.4	40.049	201	55.54	54	54.287	188	83.29	177	28.62	32	38.36	360
30.4	40.250	239	56.08	85	54.475	225	81.52	195	28.94	39	34.76	341
May 10.4	40.489	271	56.93	116	54.700	259	79.57	207	29.33	46	31.35	314
20.4	40.760	298	58.09	144	54.959	287	77.50	216	29.79	52	28.21	281
30.3	41.058	318	59.53	169	55.246	308	75.34	220	30.31	56	25.40	241
June 9.3	41.376	329	61.22	190	55.554	321	73.14	219	30.87	60	22.99	196
19.3	41.705	331	63.12	207	55.875	327	70.95	212	31.47	61	21.03	147
29.2	42.036	327	65.19	217	56.202	324	68.83	199	32.08	62	19.56	94
July 9.2	42.363	313	67.36	223	56.526	313	66.84	182	32.70	61	18.62	38
19.2	42.676	292	69.59	222	56.839	296	65.02	160	33.31	57	18.24	17
29.2	42.968	266	71.81	218	57.135	270	63.42	134	33.88	53	18.41	71
Aug. 8.1	43.234	234	73.99	208	57.405	239	62.08	107	34.41	48	19.12	122
18.1	43.468	198	76.07	194	57.644	205	61.01	78	34.89	40	20.34	170
28.1	43.666	160	78.01	178	57.849	167	60.23	48	35.29	31	22.04	210
Sept. 7.1	43.826	122	79.79	158	58.016	129	59.75	19	35.60	22	24.14	243
17.0	43.948	84	81.37	137	58.145	90	59.56	7	35.82	13	26.57	266
26.9	44.032	49	82.74	114	58.235	54	59.63	31	35.95†	4	29.23	277
Oct. 6.9	44.081	16	83.88	92	58.289	20	59.94	50	35.99	6	32.00	279
16.9	44.097	13	84.80	69	58.309	10	60.44	66	35.93	15	34.79	269
26.9	44.084	38	85.49	47	58.299	36	61.10	77	35.78	22	37.48	246
Nov. 5.9	44.046	60	85.96	25	58.263	58	61.87	84	35.56	28	39.94	214
15.9	43.986	76	86.21	3	58.205	75	62.71	86	35.28	34	42.08	172
25.8	43.910	89	86.24	16	58.130	88	63.57	83	34.94	38	43.80	123
Dec. 5.8	43.821	100	86.08	35	58.042	96	64.40	77	34.56	40	45.03	69
15.8	43.721	105	85.73	53	57.946	102	65.17	69	34.16	41	45.72	12
25.8	43.616	108	85.20	68	57.844	103	65.86	57	33.75	40	45.84	48
35.7	43.508	—	84.52	—	57.741	—	66.43	—	33.35	—	45.36	—
Mean Place	40.749	60.40	54.727	82.33	29.366	48.43						
Sec δ, Tan δ	1.034	+0.264	1.013	-0.162	2.391	-2.172						
a, a'	+3.1	+20.0	+3.1	+20.0	+2.9	+20.0						
b, b'	+0.02	0.0	-0.01	-0.1	-0.14	-0.1						
Authority and Catalogue No.	B. J. 10				B. J. 16				B. J. 17			

† Second transit, Sept. 26.

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name	α Piscium		44 Piscium		β Hydri	
	5.58	Ko	5.99	G5	2.90	Go
Mag. Spect.						
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ^m 00 17	[°] ['] +7 48	^h ^m 00 21	[°] ['] +1 33	^h ^m 00 22	[°] ['] -77 38
Jan. 0.7	^s 02.152	["] 25.95	^s 51.424	["] 26.16	^s 11.12	["] 55.83
10.7	02.049 ¹⁰³	25.25 ⁷⁰	51.323 ¹⁰¹	25.53 ⁶³	10.25 ⁸⁷	54.76 ¹⁰⁷
20.7	01.949 ¹⁰⁰	24.52 ⁷³	51.225 ⁹⁸	24.93 ⁶⁰	09.43 ⁸²	53.10 ¹⁶⁶
30.7	01.858 ⁹¹	23.79 ⁷³	51.134 ⁹¹	24.39 ⁵⁴	08.69 ⁷⁴	50.90 ²²⁰
Feb. 9.6	01.780 ⁷⁸	23.09 ⁷⁰	51.056 ⁷⁸	23.94 ⁴⁵	08.05 ⁶⁴	48.23 ²⁶⁷
		58 ⁶³	61 ³²		53 ³⁰⁹	
19.6	01.722 ³⁴	22.46 ⁵¹	50.995 ³⁶	23.62 ¹⁷	07.52 ³⁹	45.14 ³⁴¹
Mar. 1.6	01.688 ⁵	21.95 ³⁵	50.959 ⁸	23.45 ¹	07.13 ²⁵	41.73 ³⁶⁷
11.5	01.683 ³¹	21.60 ¹⁶	50.951 ²⁶	23.46 ²²	06.88 ¹¹	38.06 ³⁸²
21.5	01.714 ⁶⁸	21.44 ⁷	50.977 ⁶³	23.68 ⁴⁶	06.77 ⁵	34.24 ³⁹¹
31.5	01.782 ¹⁰⁹	21.51 ³⁴	51.040 ¹⁰³	24.14 ⁷⁰	06.82 ²⁰	30.33 ³⁹⁰
Apr. 10.5	01.891 ¹⁵¹	21.85 ⁶¹	51.143 ¹⁴⁴	24.84 ⁹⁷	07.02 ³⁶	26.43 ³⁸²
20.4	02.042 ¹⁹⁰	22.46 ⁹⁰	51.287 ¹⁸⁵	25.81 ¹²²	07.38 ⁵¹	22.61 ³⁶⁵
30.4	02.232 ²²⁹	23.36 ¹¹⁶	51.472 ²²¹	27.03 ¹⁴⁶	07.89 ⁶⁵	18.96 ³⁴¹
May 10.4	02.461 ²⁶¹	24.52 ¹⁴³	51.693 ²⁵⁶	28.49 ¹⁶⁷	08.54 ⁷⁸	15.55 ³¹⁰
20.4	02.722 ²⁸⁹	25.95 ¹⁶⁵	51.949 ²⁸³	30.16 ¹⁸⁵	09.32 ⁸⁹	12.45 ²⁷¹
30.3	03.011 ³⁰⁹	27.60 ¹⁸⁵	52.232 ³⁰⁵	32.01 ¹⁹⁸	10.21 ⁹⁸	09.74 ²²⁸
June 9.3	03.320 ³²²	29.45 ¹⁹⁸	52.537 ³¹⁹	33.99 ²⁰⁷	11.19 ¹⁰⁴	07.46 ¹⁷⁹
19.3	03.642 ³²⁷	31.43 ²⁰⁹	52.856 ³²⁴	36.06 ²¹¹	12.23 ¹⁰⁹	05.67 ¹²⁴
29.2	03.969 ³²²	33.52 ²¹²	53.180 ³²¹	38.17 ²⁰⁹	13.32 ¹¹⁰	04.43 ⁶⁹
July 9.2	04.291 ³¹²	35.64 ²¹²	53.501 ³¹²	40.26 ²⁰¹	14.42 ¹⁰⁹	03.74 ¹¹
19.2	04.603 ²⁹³	37.76 ²⁰⁵	53.813 ²⁹⁴	42.27 ¹⁹⁰	15.51 ¹⁰⁴	03.63 ⁴⁶
29.2	04.896 ²⁶⁷	39.81 ¹⁹⁵	54.107 ²⁶⁹	44.17 ¹⁷⁴	16.55 ⁹⁷	04.09 ¹⁰²
Aug. 8.1	05.163 ²³⁶	41.76 ¹⁸⁰	54.376 ²⁴⁰	45.91 ¹⁵⁴	17.52 ⁸⁶	05.11 ¹⁵⁴
18.1	05.399 ²⁰³	43.56 ¹⁶¹	54.616 ²⁰⁶	47.45 ¹³²	18.38 ⁷²	06.65 ²⁰¹
28.1	05.602 ¹⁶⁷	45.17 ¹⁴⁰	54.822 ¹⁷¹	48.77 ¹⁰⁷	19.10 ⁵⁷	08.66 ²⁴¹
Sept. 7.1	05.769 ¹²⁹	46.57 ¹¹⁹	54.993 ¹³³	49.84 ⁸³	19.67 ⁴⁰	11.07 ²⁷¹
17.0	05.898 ⁹²	47.76 ⁹⁶	55.126 ⁹⁷	50.67 ⁵⁸	20.07 ²²	13.78 ²⁹²
27.0	05.990 ⁵⁶	48.72 ⁷³	55.223 ⁶¹	51.25 ³⁴	20.29 ³	16.70 ³⁰¹
Oct. 6.9	06.046 ²⁴	49.45 ⁵⁰	55.284 ²⁸	51.59 ¹²	20.32 ¹⁵	19.71 ²⁹⁸
16.9	06.070 ⁵	49.95 ²⁹	55.312 ¹	51.71 ⁶	20.17 ³⁴	22.69 ²⁸²
26.9	06.065 ³⁰	50.24 ¹¹	55.311 ²⁷	51.65 ²⁴	19.83 ⁵⁰	25.51 ²⁵⁷
Nov. 5.9	06.035 ⁵¹	50.35 ⁷	55.284 ⁴⁸	51.41 ³⁶	19.33 ⁶⁴	28.08 ²¹⁸
15.9	05.984 ⁶⁹	50.28 ²⁴	55.236 ⁶⁶	51.05 ⁴⁸	18.69 ⁷⁵	30.26 ¹⁷¹
25.8	05.915 ⁸³	50.04 ³⁶	55.170 ⁸⁰	50.57 ⁵⁶	17.94 ⁸⁴	31.97 ¹¹⁷
Dec. 5.8	05.832 ⁹⁴	49.68 ⁴⁹	55.090 ⁹¹	50.01 ⁶⁰	17.10 ⁸⁹	33.14 ⁵⁷
15.8	05.738 ⁹⁹	49.19 ⁵⁸	54.999 ⁹⁷	49.41 ⁶⁴	16.21 ⁹¹	33.71 ⁶
25.8	05.639 ¹⁰²	48.61 ⁶⁶	54.902 ¹⁰¹	48.77 ⁶⁴	15.30 ⁹⁰	33.65 ⁶⁷
35.7	05.537	47.95	54.801	48.13	14.40	32.98
Mean Place	02.656	26.00	51.839	28.27	09.276	34.29
Sec δ , Tan δ	1.009	+0.137	1.000	+0.027	4.673	-4.564
$a, a,$	+3.1	+20.0	+3.1	+20.0	+2.5	+20.0
$b, b,$	+0.01	-0.1	0.00	-0.1	-0.30	-0.1
Authority and Catalogue No.	N.A.	18	N.A.	21	B.J.	22

† Second transit, Sept. 26.

† First transit, Sept. 27.

APPARENT PLACES OF STARS, 1931.

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AT UPPER TRANSIT AT GREENWICH.

Name	α Phoenicis		ι2 Ceti		ε Andromedæ	
	2.44	Ko	6.05	K5	4.52	G5
Mag. Spect.						
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 00 ^m 22	[°] —42 ['] 40	^h 00 ^m 26	[°] —4 ['] 19	^h 00 ^m 34	[°] +28 ['] 56
Jan. 0.7	52.766	65.74	30.667	81.97	53.553	22.63
10.7	52.589	65.61	30.565	82.54	53.418	21.99
20.7	52.422	65.02	30.466	83.01	53.282	21.09
30.7	52.270	64.00	30.373	83.36	53.153	19.96
Feb. 9.6	52.140	62.57	30.293	83.57	53.036	18.66
19.6	52.037	60.75	30.230	83.61	52.939	17.24
Mar. 1.6	51.967	58.59	30.190	83.46	52.870	15.78
11.6	51.935	56.14	30.178	83.11	52.834	14.34
21.5	51.945	53.44	30.198	82.53	52.839	13.00
31.5	52.003	50.55	30.256	81.72	52.889	11.83
Apr. 10.5	52.109	47.51	30.354	80.66	52.986	10.90
20.4	52.266	44.40	30.492	79.36	53.132	10.25
30.4	52.472	41.26	30.671	77.83	53.325	09.94
May 10.4	52.726	38.17	30.888	76.10	53.562	09.98
20.4	53.023	35.18	31.139	74.20	53.838	10.40
30.3	53.358	32.39	31.419	72.17	54.146	11.18
June 9.3	53.721	29.84	31.722	70.06	54.479	12.32
19.3	54.106	27.60	32.039	67.91	54.827	13.79
29.3	54.503	25.72	32.364	65.78	55.182	15.54
July 9.2	54.901	24.24	32.687	63.73	55.536	17.54
19.2	55.290	23.20	33.000	61.80	55.878	19.73
29.2	55.658	22.64	33.297	60.05	56.202	22.07
Aug. 8.1	55.999	22.55	33.571	58.50	56.501	24.49
18.1	56.304	22.93	33.816	57.20	56.768	26.95
28.1	56.565	23.75	34.027	56.17	57.001	29.39
Sept. 7.1	56.777	24.99	34.202	55.41	57.196	31.76
17.0	56.937	26.58	34.340	54.93	57.352	34.03
27.0	57.044	28.46	34.441	54.71	57.468	36.16
Oct. 6.9	57.099	30.55	34.506	54.73	57.547	38.11
16.9	57.104	32.75	34.537	54.96	57.590	39.85
26.9	57.063	34.96	34.539	55.37	57.599	41.37
Nov. 5.9	56.982	37.10	34.514	55.91	57.578	42.64
15.9	56.867	39.07	34.468	56.56	57.531	43.64
25.8	56.725	40.77	34.403	57.27	57.459	44.36
Dec. 5.8	56.563	42.16	34.323	58.00	57.367	44.79
15.8	56.388	43.17	34.232	58.72	57.258	44.91
25.8	56.207	43.76	34.135	59.40	57.137	44.73
35.7	56.025	43.91	34.033	60.03	57.006	44.26
Mean Place	52.678	49.64	30.999	77.93	54.182	14.78
Sec δ, Tan δ	1.360	—0.922	1.003	—0.076	1.143	+0.553
a, a'	+3.0	+19.9	+3.1	+19.9	+3.2	+19.8
b, b'	—0.06	—0.1	—0.01	—0.1	+0.04	—0.2
Authority and Catalogue No.	B.J.	23	B.J.	25	A.N.	35

† First transit, Sept. 27.

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name Mag. Spect.	δ Andromedæ		α Cassiopeiæ		β Ceti	
	3.49	K2	Var.	Ko	2.24	Ko
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ₀₀ ^m ₃₅	[°] ₊₃₀ ['] ₂₈	^h ₀₀ ^m ₃₆	[°] ₊₅₆ ['] ₀₉	^h ₀₀ ^m ₄₀	[°] ₋₁₈ ['] ₂₁
Jan. 0.7	37.239 ^s	69.52 ["]	33.534 ^s	48.98 ["]	07.502 ^s	62.41 ["]
10.7	37.101 ¹³⁸	68.90 ⁶²	33.255 ²⁷⁹	48.66 ³²	07.387 ¹¹⁵	62.85 ⁴⁴
20.7	36.962 ¹³⁹	68.00 ⁹⁰	32.976 ²⁷⁹	47.84 ⁸²	07.273 ¹¹⁴	63.03 ¹⁸
30.7	36.830 ¹³²	66.86 ¹¹⁴	32.709 ²⁶⁷	46.55 ¹²⁹	07.166 ¹⁰⁷	62.96 ⁷
Feb. 9.6	36.710 ¹²⁰	65.53 ¹³³	32.466 ²⁴³	44.85 ¹⁷⁰	07.069 ⁹⁷	62.62 ³⁴
19.6	36.610 ¹⁰⁰	64.07 ¹⁴⁶	32.259 ²⁰⁷	42.81 ²⁰⁴	06.990 ⁷⁹	62.01 ⁶¹
Mar. 1.6	36.538 ⁷²	62.55 ¹⁵²	32.101 ¹⁵⁸	40.51 ²³⁰	06.933 ⁵⁷	61.13 ⁸⁸
11.6	36.501 ³⁷	61.05 ¹⁵⁰	32.001 ¹⁰⁰	38.07 ²⁴⁴	06.904 ²⁹	59.98 ¹¹⁵
21.5	36.504 ³	59.63 ¹⁴²	31.969 ³²	35.58 ²⁴⁹	06.908 ⁴	58.58 ¹⁴⁰
31.5	36.554 ⁵⁰	58.38 ¹²⁵	32.010 ⁴¹	33.17 ²⁴¹	06.949 ⁴¹	56.93 ¹⁶⁵
Apr. 10.5	36.651 ⁹⁷	57.36 ¹⁰²	32.127 ¹¹⁷	30.92 ²²⁵	07.031 ⁸²	55.06 ¹⁸⁷
20.4	36.798 ¹⁴⁷	56.63 ⁷³	32.319 ¹⁹²	28.93 ¹⁹⁹	07.156 ¹²⁵	52.99 ²⁰⁷
30.4	36.993 ¹⁹⁵	56.24 ³⁹	32.583 ²⁶⁴	27.28 ¹⁶⁵	07.323 ¹⁶⁷	50.76 ²²³
May 10.4	37.233 ²⁴⁰	56.20 ⁴	32.912 ³²⁹	26.05 ¹²³	07.530 ²⁰⁷	48.41 ²³⁵
20.4	37.512 ²⁷⁹	56.55 ³⁵	33.298 ³⁸⁶	25.28 ⁷⁷	07.775 ²⁴⁵	45.98 ²⁴³
30.3	37.824 ³¹²	57.27 ⁷²	33.731 ⁴³³	24.99 ²⁹	08.052 ²⁷⁷	43.53 ²⁴⁵
June 9.3	38.161 ³³⁷	58.35 ¹⁰⁸	34.197 ⁴⁶⁶	25.20 ²¹	08.355 ³⁰³	41.11 ²⁴²
19.3	38.514 ³⁵³	59.78 ¹⁴³	34.686 ⁴⁸⁹	25.90 ⁷⁰	08.676 ³²¹	38.79 ²³²
29.3	38.875 ³⁶¹	61.51 ¹⁷³	35.181 ⁴⁹⁵	27.09 ¹¹⁹	09.008 ³³²	36.61 ²¹⁸
July 9.2	39.233 ³⁵⁸	63.50 ¹⁹⁹	35.674 ⁴⁹³	28.73 ¹⁶⁴	09.342 ³³⁴	34.64 ¹⁹⁷
19.2	39.580 ³⁴⁷	65.69 ²¹⁹	36.150 ⁴⁷⁶	30.77 ²⁰⁴	09.669 ³²⁷	32.92 ¹⁷²
29.2	39.909 ³²⁹	68.04 ²³⁵	36.600 ⁴⁵⁰	33.17 ²⁴⁰	09.982 ³¹³	31.49 ¹⁴³
Aug. 8.1	40.212 ³⁰³	70.50 ²⁴⁶	37.013 ⁴¹³	35.87 ²⁷⁰	10.274 ²⁹²	30.39 ¹¹⁰
18.1	40.483 ²⁷¹	73.00 ²⁵⁰	37.383 ³⁷⁰	38.82 ²⁹⁵	10.537 ²⁶³	29.65 ⁷⁴
28.1	40.720 ²³⁷	75.49 ²⁴⁹	37.702 ³¹⁹	41.96 ³¹⁴	10.768 ²³¹	29.26 ³⁹
Sept. 7.1	40.918 ¹⁵⁸	77.93 ²⁴⁴	37.967 ²⁶⁵	45.21 ³²⁵	10.962 ¹⁹⁴	29.22 ⁴
17.0	41.076 ¹¹⁹	80.28 ²³⁵	38.176 ²⁰⁹	48.51 ³³⁰	11.117 ¹⁵⁵	29.51 ²⁹
27.0	41.195 ⁷⁹	82.48 ²²⁰	38.327 ¹⁵¹	51.81 ³³⁰	11.233 ¹¹⁶	30.11 ⁶⁰
Oct. 6.9	41.274 ¹	84.52 ²⁰⁴	38.420 ⁹³	55.04 ³²³	11.311 ⁷⁸	30.96 ⁸⁵
16.9	41.318 ⁴⁴	86.35 ¹⁸³	38.457 ³⁷	58.13 ³⁰⁹	11.352 ⁴¹	32.01 ¹⁰⁵
26.9	41.329 ¹¹	87.96 ¹⁶¹	38.441 ¹⁶	61.02 ²⁸⁹	11.360 ⁸	33.21 ¹²⁰
Nov. 5.9	41.308 ²¹	89.32 ¹³⁶	38.373 ⁶⁸	63.65 ²⁶³	11.338 ²²	34.49 ¹²⁸
15.9	41.260 ⁴⁸	90.41 ¹⁰⁹	38.258 ¹¹⁵	65.95 ²³⁰	11.291 ⁴⁷	35.78 ¹²⁹
25.8	41.188 ⁷²	91.21 ⁸⁰	38.100 ¹⁵⁸	67.88 ¹⁹³	11.222 ⁶⁹	37.02 ¹²⁴
Dec. 5.8	41.095 ⁹³	91.70 ⁴⁹	37.904 ¹⁹⁶	69.38 ¹⁵⁰	11.136 ⁸⁶	38.16 ¹¹⁴
15.8	40.984 ¹¹¹	91.88 ¹⁸	37.675 ²²⁹	70.41 ¹⁰³	11.037 ⁹⁹	39.16 ¹⁰⁰
25.8	40.860 ¹²⁴	91.75 ¹³	37.422 ²⁵³	70.94 ⁵³	10.928 ¹⁰⁹	39.97 ⁸¹
35.7	40.726 ¹³⁴	91.31 ⁴⁴	37.151 ²⁷¹	70.95 ¹	10.814 ¹¹⁴	40.55 ⁵⁸
Mean Place	37.883	61.15	34.663	33.56	07.608	54.04
Sec δ , Tan δ	1.160	+0.589	1.796	+1.491	1.054	-0.332
a, a'	+3.2	+19.8	+3.4	+19.8	+3.0	+19.7
b, b'	+0.04	-0.2	+0.10	-0.2	-0.02	-0.2
Authority and Catalogue No.	B.J.	36	B.J.	37	B.J.	39

APPARENT PLACES OF STARS, 1931.

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AT UPPER TRANSIT AT GREENWICH.

Name	δ Piscium		20 Ceti		γ Cassiopeiæ	
	4.55	K5	4.92	Ko	2.25	Bop
Mag. Spect.						
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 00 ^m 45	[°] + 7 ['] 12	^h 00 ^m 49	[°] — 1 ['] 30	^h 00 ^m 52	[°] +60 ['] 20
Jan. 0.8	05.652	36.37	28.567	68.95	30.51	53.62
10.7	05.547 ¹⁰⁵	35.73 ⁶⁴	28.463 ¹⁰⁴	69.56 ⁶¹	30.18 ³³	53.58 ⁴
20.7	05.440 ¹⁰⁷	35.07 ⁶⁶	28.356 ¹⁰⁷	70.10 ⁵⁴	29.85 ³³	53.00 ⁵⁸
30.7	05.337 ¹⁰³	34.41 ⁶⁶	28.253 ¹⁰³	70.54 ⁴⁴	29.53 ³²	51.92 ¹⁰⁸
Feb. 9.6	05.243 ⁹⁴	33.79 ⁶²	28.158 ⁹⁵	70.86 ³²	29.23 ³⁰	50.37 ¹⁵⁵
	80	55	81	17	27	194
19.6	05.163	33.24	28.077	71.03	28.96	48.43
Mar. 1.6	05.105 ⁵⁸	32.80 ⁴⁴	28.017 ⁶⁰	71.03	28.75 ²¹	46.19 ²²⁴
11.6	05.075 ³⁰	32.51 ²⁹	27.984 ³³	70.84 ¹⁹	28.60 ¹⁵	43.73 ²⁴⁶
21.5	05.077 ²	32.40 ¹¹	27.982 ²	70.43 ⁴¹	28.53 ⁷	41.18 ²⁵⁵
31.5	05.117 ⁴⁰	32.50 ¹⁰	28.017 ³⁵	69.80 ⁶³	28.54 ¹	38.63 ²⁵⁵
	81	35	74	89	9	242
Apr. 10.5	05.198	32.85	28.091	68.91	28.63	36.21
20.5	05.322 ¹²⁴	33.46 ⁶¹	28.208 ¹¹⁷	67.79 ¹¹²	28.81 ¹⁸	34.00 ²²¹
30.4	05.488 ¹⁶⁶	34.33 ⁸⁷	28.366 ¹⁵⁸	66.43 ¹³⁶	29.08 ²⁷	32.10 ¹⁹⁰
May 10.4	05.694 ²⁰⁶	35.47 ¹¹⁴	28.565 ¹⁹⁹	64.86 ¹⁵⁷	29.42 ³⁴	30.58 ¹⁵²
20.4	05.937 ²⁴³	36.86 ¹³⁹	28.800 ²³⁵	63.09 ¹⁷⁷	29.82 ⁴⁰	29.50 ¹⁰⁸
	273	161	267	192	46	60
30.3	06.210	38.47	29.067	61.17	30.28	28.90
June 9.3	06.509 ²⁹⁹	40.26 ¹⁷⁹	29.360 ²⁹³	59.13 ²⁰⁴	30.79 ⁵¹	28.79 ¹¹
19.3	06.825 ³¹⁶	42.19 ¹⁹³	29.671 ³¹¹	57.02 ²¹¹	31.32 ⁵³	29.19 ⁴⁰
29.3	07.149 ³²⁴	44.22 ²⁰³	29.991 ³²⁰	54.91 ²¹¹	31.86 ⁵⁴	30.09 ⁹⁰
July 9.2	07.475 ³²⁶	46.29 ²⁰⁷	30.314 ³²³	52.84 ²⁰⁷	32.41 ⁵⁵	31.45 ¹³⁶
	318	206	318	198	53	181
19.2	07.793	48.35	30.632	50.86	32.94	33.26
29.2	08.097 ³⁰⁴	50.35 ²⁰⁰	30.936 ³⁰⁴	49.02 ¹⁸⁴	33.45 ⁵¹	35.46 ²²⁰
Aug. 8.2	08.380 ²⁸³	52.24 ¹⁸⁹	31.220 ²⁸⁴	47.37 ¹⁶⁵	33.92 ⁴⁷	38.01 ²⁵⁵
18.1	08.636 ²⁵⁶	53.99 ¹⁷⁵	31.479 ²⁵⁹	45.94 ¹⁴³	34.35 ⁴³	40.84 ²⁸³
28.1	08.862 ²²⁶	55.56 ¹⁵⁷	31.707 ²²⁸	44.75 ¹¹⁹	34.73 ³⁸	43.91 ³⁰⁷
	192	136	194	92	32	323
Sept. 7.1	09.054	56.92	31.901	43.83	35.05	47.14
17.0	09.210 ¹⁵⁶	58.05 ¹¹³	32.061 ¹⁶⁰	43.18 ⁶⁵	35.31 ²⁶	50.48 ³³⁴
27.0	09.330 ¹²⁰	58.96 ⁹¹	32.185 ¹²⁴	42.79 ³⁹	35.51 ²⁰	53.85 ³³⁷
Oct. 6.9	09.416 ⁸⁶	59.63 ⁶⁷	32.273 ⁸⁸	42.65 ¹⁴	35.64 ¹³	57.20 ³³⁵
16.9	09.469 ⁵³	60.08 ⁴⁵	32.329 ⁵⁶	42.73 ⁸	35.71 ⁷	60.46 ³²⁶
	23	25	25	27	1	309
26.9	09.492	60.33	32.354	43.00	35.72	63.55
Nov. 5.9	09.488 ⁴	60.39 ⁶	32.351 ³	43.43 ⁴³	35.67 ⁵	66.42 ²⁸⁷
15.9	09.460 ²⁸	60.29 ¹⁰	32.324 ²⁷	43.98 ⁵⁵	35.56 ¹¹	68.99 ²⁵⁷
25.9	09.410 ⁵⁰	60.04 ²⁵	32.276 ⁴⁸	44.62 ⁶⁴	35.40 ¹⁶	71.21 ²²²
Dec. 5.8	09.343 ⁶⁷	59.67 ³⁷	32.209 ⁶⁷	45.30 ⁶⁸	35.19 ²¹	73.01 ¹⁸⁰
	82	47	80	70	25	133
15.8	09.261	59.20	32.129	46.00	34.94	74.34
25.8	09.168 ⁹³	58.64 ⁵⁶	32.036 ⁹³	46.69 ⁶⁹	34.65 ²⁹	75.17 ⁸³
35.7	09.067 ¹⁰¹	58.03 ⁶¹	31.935 ¹⁰¹	47.34 ⁶⁵	34.34 ³¹	75.46 ²⁹
Mean Place	05.985	35.62	28.788	66.75	31.592	36.81
Sec δ, Tan δ	1.008	+0.127	1.000	-0.026	2.021	+1.756
a, a'	+3.1	+19.7	+3.1	+19.6	+3.6	+19.5
b, b'	+0.01	-0.2	0.00	-0.2	+0.11	-0.2
Authority and Catalogue No.	A.N.	47	N.A.	52	B.J.	53

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name	μ Andromedæ		α Sculptoris		ϵ Piscium	
	3·94	A2	4·39	B5	4·45	Ko
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 00 ^m 52	[°] +38 ['] 07	^h 00 ^m 55	[°] -29 ['] 43	^h 00 ^m 59	[°] +7 ['] 31
Jan. 0·8	54·286 ^s ₁₆₂	43·05 ["] ₄₀	17·081 ^s ₁₄₁	59·16 ["] ₃₇	21·289 ^s ₁₀₆	10·08 ["] ₆₁
10·7	54·124 ^s ₁₆₆	42·65 ["] ₇₆	16·940 ^s ₁₄₀	59·53 ["] ₂	21·183 ^s ₁₁₀	09·47 ["] ₆₄
20·7	53·958 ^s ₁₆₃	41·89 ["] ₁₀₇	16·800 ^s ₁₃₆	59·55 ["] ₃₅	21·073 ^s ₁₀₉	08·83 ["] ₆₃
30·7	53·795 ^s ₁₅₂	40·82 ["] ₁₃₆	16·664 ^s ₁₂₅	59·20 ["] ₇₂	20·964 ^s ₁₀₃	08·20 ["] ₆₀
Feb. 9·7	53·643 ^s ₁₃₂	39·46 ["] ₁₅₆	16·539 ^s ₁₀₇	58·48 ["] ₁₀₆	20·861 ^s ₉₀	07·60 ["] ₅₃
19·6	53·511 ^s ₁₀₄	37·90 ["] ₁₇₀	16·432 ^s ₈₅	57·42 ["] ₁₄₀	20·771 ^s ₇₀	07·07 ["] ₄₄
Mar. 1·6	53·407 ^s ₆₇	36·20 ["] ₁₇₆	16·347 ^s ₅₆	56·02 ["] ₁₇₁	20·701 ^s ₄₄	06·63 ["] ₂₉
11·6	53·340 ^s ₂₂	34·44 ["] ₁₇₄	16·291 ^s ₂₁	54·31 ["] ₂₀₀	20·657 ^s ₁₂	06·34 ["] ₁₃
21·5	53·318 ^s ₂₈	32·70 ["] ₁₆₃	16·270 ^s ₁₉	52·31 ["] ₂₂₅	20·645 ^s ₂₅	06·21 ["] ₉
31·5	53·346 ^s ₈₂	31·07 ["] ₁₄₅	16·289 ^s ₆₃	50·06 ["] ₂₄₇	20·670 ^s ₆₇	06·30 ["] ₃₂
Apr. 10·5	53·428 ^s ₁₃₆	29·62 ["] ₁₁₈	16·352 ^s ₁₀₇	47·59 ["] ₂₆₃	20·737 ^s ₁₀₉	06·62 ["] ₅₇
20·5	53·564 ^s ₁₉₀	28·44 ["] ₈₇	16·459 ^s ₁₅₄	44·96 ["] ₂₇₆	20·846 ^s ₁₅₃	07·19 ["] ₈₃
30·4	53·754 ^s ₂₄₀	27·57 ["] ₅₁	16·613 ^s ₁₉₈	42·20 ["] ₂₈₂	20·999 ^s ₁₉₄	08·02 ["] ₁₁₀
May 10·4	53·994 ^s ₂₈₅	27·06 ["] ₁₂	16·811 ^s ₂₄₀	39·38 ["] ₂₈₃	21·193 ^s ₂₃₂	09·12 ["] ₁₃₃
20·4	54·279 ^s ₃₂₄	26·94 ["] ₂₉	17·051 ^s ₂₇₆	36·55 ["] ₂₇₈	21·425 ^s ₂₆₅	10·45 ["] ₁₅₆
30·4	54·603 ^s ₃₅₃	27·23 ["] ₆₉	17·327 ^s ₃₀₇	33·77 ["] ₂₆₆	21·690 ^s ₂₉₂	12·01 ["] ₁₇₅
June 9·3	54·956 ^s ₃₇₄	27·92 ["] ₁₀₇	17·634 ^s ₃₁₁	31·11 ["] ₂₄₇	21·982 ^s ₃₁₁	13·76 ["] ₁₈₉
19·3	55·330 ^s ₃₈₃	28·99 ["] ₁₄₄	17·965 ^s ₃₄₅	28·64 ["] ₂₂₄	22·293 ^s ₃₂₃	15·65 ["] ₂₀₀
29·3	55·713 ^s ₃₈₅	30·43 ["] ₁₇₆	18·310 ^s ₃₅₁	26·40 ["] ₁₉₄	22·616 ^s ₃₂₆	17·65 ["] ₂₀₄
July 9·2	56·098 ^s ₃₇₆	32·19 ["] ₂₀₄	18·661 ^s ₃₄₈	24·46 ["] ₁₆₀	22·942 ^s ₃₂₁	19·69 ["] ₂₀₄
19·2	56·474 ^s ₃₆₀	34·23 ["] ₂₂₇	19·009 ^s ₃₃₇	22·86 ["] ₁₂₀	23·263 ^s ₃₀₈	21·73 ["] ₁₉₉
29·2	56·834 ^s ₃₃₅	36·50 ["] ₂₄₆	19·346 ^s ₃₁₇	21·66 ["] ₇₉	23·571 ^s ₂₉₀	23·72 ["] ₁₈₈
Aug. 8·2	57·169 ^s ₃₀₅	38·96 ["] ₂₅₇	19·663 ^s ₂₈₉	20·87 ["] ₃₇	23·861 ^s ₂₆₅	25·60 ["] ₁₇₅
18·1	57·474 ^s ₂₆₉	41·53 ["] ₂₆₄	19·952 ^s ₂₅₇	20·50 ["] ₆	24·126 ^s ₂₃₆	27·35 ["] ₁₅₆
28·1	57·743 ^s ₂₃₀	44·17 ["] ₂₆₆	20·209 ^s ₂₁₉	20·56 ["] ₄₈	24·362 ^s ₂₀₄	28·91 ["] ₁₃₆
Sept. 7·1	57·973 ^s ₁₈₉	46·83 ["] ₂₆₂	20·428 ^s ₁₇₈	21·04 ["] ₈₆	24·566 ^s ₁₆₉	30·27 ["] ₁₁₄
17·1	58·162 ^s ₁₄₈	49·45 ["] ₂₅₄	20·606 ^s ₁₃₅	21·90 ["] ₁₂₀	24·735 ^s ₁₃₄	31·41 ["] ₉₁
27·0	58·310 ^s ₁₀₆	51·99 ["] ₂₄₂	20·741 ^s ₉₄	23·10 ["] ₁₄₆	24·869 ^s ₁₀₀	32·32 ["] ₆₈
Oct. 6·9	58·416 ^s ₆₇	54·41 ["] ₂₂₆	20·835 ^s ₅₂	24·56 ["] ₁₆₇	24·969 ^s ₆₈	33·00 ["] ₄₆
16·9	58·483 ^s ₃₀	56·67 ["] ₂₀₄	20·887 ^s ₁₄	26·23 ["] ₁₈₀	25·037 ^s ₃₇	33·46 ["] ₂₆
26·9	58·513 ^s ₆	58·71 ["] ₁₈₁	20·901 ^s ₂₂	28·03 ["] ₁₈₃	25·074 ^s ₉	33·72 ["] ₇
Nov. 5·9	58·507 ^s ₃₉	60·52 ["] ₁₅₄	20·879 ^s ₅₂	29·86 ["] ₁₇₉	25·083 ^s ₁₆	33·79 ["] ₉
15·9	58·468 ^s ₆₉	62·06 ["] ₁₂₄	20·827 ^s ₇₉	31·65 ["] ₁₆₈	25·067 ^s ₃₉	33·70 ["] ₂₃
25·9	58·399 ^s ₉₅	63·30 ["] ₅₅	20·748 ^s ₁₀₁	33·33 ["] ₁₂₃	25·028 ^s ₇₅	33·47 ["] ₄₅
Dec. 5·8	58·304 ^s ₁₁₉	64·21 ["] ₁₉	20·647 ^s ₁₃₀	34·82 ["] ₉₃	24·969 ^s ₉₀	33·11 ["] ₅₃
15·8	58·185 ^s ₁₃₉	64·76 ["] ₁₈	20·529 ^s ₁₃₉	36·05 ["] ₆₀	24·894 ^s ₁₀₀	32·66 ["] ₅₉
25·8	58·046 ^s ₁₅₃	64·95 ["] ₁₈	20·399 ^s ₁₃₉	36·98 ["] ₆₀	24·804 ^s ₁₀₀	32·13 ["] ₅₉
35·8	57·893 ^s ₁₅₃	64·77 ["] ₁₈	20·260 ^s ₁₃₉	37·58 ["] ₆₀	24·704 ^s ₁₀₀	31·54 ["] ₅₉
Mean Place	54·908	31·74	16·947	47·79	21·539	08·72
Sec δ , Tan δ	1·271	+0·785	1·152	-0·571	1·009	+0·132
a , a'	+3·3	+19·5	+2·9	+19·5	+3·1	+19·4
b , b'	+0·05	-0·2	-0·04	-0·2	+0·01	-0·3
Authority and Catalogue No.	B. J.	55	B. J.	57	B. J.	59

† Second transit, Oct. 6.

† First transit, Oct. 7.

APPARENT PLACES OF STARS, 1931.

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AT UPPER TRANSIT AT GREENWICH.

Name	72 Piscium		β Phœnicis <i>m.</i>		β Andromedæ	
Mag. Spect.	5.65	F2	3.35	Ko	2.37	Ma
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h OI	^m OI	^h OI	^m O2	^h OI	^m O5
		[°] +14		[°] -47		[°] +35
		['] 34		['] 04		['] 15
Jan. 0.8	26.269	35.93	60.998	91.16	51.159	29.67
10.7	26.158 ¹¹¹	35.35 ⁵⁸	60.782 ²¹⁶	91.33 ¹⁷	51.010 ¹⁴⁹	29.33 ³⁴
20.7	26.042 ¹¹⁶	34.67 ⁶⁸	60.567 ²¹⁵	91.01 ³²	50.853 ¹⁵⁷	28.67 ⁶⁶
30.7	25.927 ¹¹⁵	33.92 ⁷⁵	60.360 ²⁰⁷	90.19 ⁸²	50.696 ¹⁵⁷	27.71 ⁹⁶
Feb. 9.7	25.818 ¹⁰⁹	33.12 ⁸⁰	60.169 ¹⁹¹	88.91 ¹²⁸	50.546 ¹⁵⁰	26.50 ¹²¹
19.6	25.722 ⁹⁶	32.33 ⁷⁹	60.001 ¹⁶⁸	87.18 ¹⁷³	50.413 ¹³³	25.10 ¹⁴⁰
Mar. 1.6	25.647 ⁷⁵	31.58 ⁷⁵	59.862 ¹³⁹	85.05 ²¹³	50.305 ¹⁰⁸	23.56 ¹⁵⁴
11.6	25.598 ⁴⁹	30.92 ⁶⁶	59.761 ¹⁰¹	82.56 ²⁴⁹	50.230 ⁷⁵	21.96 ¹⁶⁰
21.5	25.583 ¹⁵	30.40 ⁵²	59.703 ⁵⁸	79.78 ²⁷⁸	50.197 ³³	20.38 ¹⁵⁸
31.5	25.607 ²⁴	30.07 ³³	59.694 ⁹	76.75 ³⁰³	50.211 ¹⁴	18.91 ¹⁴⁷
Apr. 10.5	25.673 ⁶⁶	29.96 ¹¹	59.737 ⁴³	73.54 ³²¹	50.277 ⁶⁶	17.60 ¹³¹
20.5	25.783 ¹¹⁰	30.11 ¹⁵	59.835 ⁹⁸	70.21 ³³³	50.395 ¹¹⁸	16.54 ¹⁰⁶
30.4	25.938 ¹⁵⁵	30.53 ⁴²	59.989 ¹⁵⁴	66.82 ³³⁹	50.567 ¹⁷²	15.77 ⁷⁷
May 10.4	26.136 ¹⁹⁸	31.24 ⁷¹	60.199 ²¹⁰	63.46 ³³⁶	50.789 ²²²	15.34 ⁴³
20.4	26.373 ²³⁷	32.23 ⁹⁹	60.460 ²⁶¹	60.19 ³²⁷	51.056 ²⁶⁷	15.27 ⁷
30.4	26.643 ²⁷⁰	33.49 ¹²⁶	60.767 ³⁰⁷	57.08 ³¹¹	51.363 ³⁰⁷	15.58 ³¹
June 9.3	26.940 ²⁹⁷	34.99 ¹⁵⁰	61.114 ³⁴⁷	54.21 ²⁸⁷	51.700 ³³⁷	16.27 ⁶⁹
19.3	27.258 ³¹⁸	36.69 ¹⁷⁰	61.492 ³⁷⁸	51.64 ²⁵⁷	52.060 ³⁶⁰	17.32 ¹⁰⁵
29.3	27.586 ³²⁸	38.56 ¹⁸⁷	61.893 ⁴⁰¹	49.43 ²²¹	52.432 ³⁷²	18.71 ¹³⁹
July 9.2	27.918 ³³²	40.54 ¹⁹⁸	62.305 ⁴¹²	47.64 ¹⁷⁹	52.808 ³⁷⁶	20.40 ¹⁶⁹
19.2	28.246 ³²⁸	42.60 ²⁰⁶	62.717 ⁴¹²	46.32 ¹³²	53.179 ³⁷¹	22.35 ¹⁹⁵
29.2	28.560 ³¹⁴	44.67 ²⁰⁷	63.119 ⁴⁰²	45.50 ⁸²	53.535 ³⁵⁶	24.52 ²¹⁷
Aug. 8.2	28.856 ²⁹⁶	46.70 ²⁰³	63.500 ³⁸¹	45.20 ³⁰	53.870 ³³⁵	26.84 ²³²
18.1	29.127 ²⁷¹	48.66 ¹⁹⁶	63.851 ³⁵¹	45.42 ²²	54.178 ³⁰⁸	28.71 ²⁴³
28.1	29.368 ²⁴¹	50.50 ¹⁸⁴	64.164 ³¹³	46.14 ⁷²	54.453 ²⁷⁵	31.75 ²⁴⁸
Sept. 7.1	29.577 ²⁰⁹	52.18 ¹⁶⁸	64.431 ²⁶⁷	47.34 ¹²⁰	54.692 ²³⁹	34.24 ²⁴⁹
17.1	29.751 ¹⁷⁴	53.69 ¹⁵¹	64.647 ²¹⁶	48.95 ¹⁶¹	54.892 ²⁰⁰	36.69 ²⁴⁵
27.0	29.890 ¹³⁹	55.00 ¹³¹	64.810 ¹⁶³	50.93 ¹⁹⁸	55.053 ¹⁶¹	39.06 ²³⁷
Oct. 7.0	29.995 ¹⁰⁵	56.11 ¹¹¹	64.917 ¹⁰⁷	53.18 ²²⁵	55.175 ¹²²	41.30 ²²⁴
16.9	30.067 ⁷²	57.00 ⁸⁹	64.969 ⁵²	55.60 ²⁴²	55.259 ⁸⁴	43.39 ²⁰⁹
26.9	30.108 ⁴¹	57.69 ⁶⁹	64.968 ¹	58.11 ²⁵¹	55.306 ⁴⁷	45.29 ¹⁹⁰
Nov. 5.9	30.120 ¹²	58.17 ⁴⁸	64.920 ⁴⁸	60.58 ²⁴⁷	55.319 ¹³	46.96 ¹⁶⁷
15.9	30.106 ¹⁴	58.46 ²⁹	64.827 ⁹³	62.92 ²³⁴	55.299 ²⁰	48.38 ¹⁴²
25.9	30.068 ³⁸	58.57 ¹¹	64.696 ¹³¹	65.03 ²¹¹	55.249 ⁵⁰	49.53 ¹¹⁵
Dec. 5.8	30.010 ⁵⁸	58.50 ⁷	64.534 ¹⁶²	66.83 ¹⁸⁰	55.172 ⁷⁷	50.38 ⁸⁵
15.8	29.933 ⁷⁷	58.28 ²²	64.348 ¹⁸⁶	68.24 ¹⁴¹	55.070 ¹⁰²	50.91 ⁵³
25.8	29.840 ⁹³	57.90 ³⁸	64.144 ²⁰⁴	69.21 ⁹⁷	54.947 ¹²³	51.10 ¹⁹
35.8	29.736 ¹⁰⁴	57.39 ⁵¹	63.930 ²¹⁴	69.70 ⁴⁹	54.807 ¹⁴⁰	50.96 ¹⁴
Mean Place	26.573	32.01	60.477	75.56	51.650	18.81
Sec δ , Tan δ	1.033	+0.260	1.469	-1.076	1.225	+0.707
<i>a</i> , <i>a'</i>	+3.2	+19.3	+2.7	+19.3	+3.3	+19.2
<i>b</i> , <i>b'</i>	+0.02	-0.3	-0.07	-0.3	+0.05	-0.3
Authority and Catalogue No.	N.A.	61	B.J.	63	B.J.	69

† First transit, Oct. 7.

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name	ζ ¹ Piscium			θ Ceti			δ Cassiopeiae		
Mag. Spect.	5.57 A5		3.83 Ko		2.80 A5				
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.			
	^h OI ^m IO	[°] +7 ['] 12	^h OI ^m 20	[°] —8 ['] 31	^h OI ^m 21	[°] +59 ['] 52			
Jan. 0.8	07.204 ^s 106	41.21 ["] 60	34.446 ^s 108	83.43 ["] 66	16.269 ^s 306	56.13 ["] 30			
10.8	07.098 111	40.61 61	34.338 115	84.09 50	15.963 322	56.43 23			
20.7	06.987 113	40.00 61	34.223 117	84.59 32	15.641 326	56.20 74			
30.7	06.874 108	39.39 58	34.106 114	84.91 12	15.315 313	55.46 122			
Feb. 9.7	06.766 96	38.81 51	33.992 103	85.03 9	15.002 286	54.24 164			
19.6	06.670 78	38.30 40	33.889 87	84.94 31	14.716 244	52.60 200			
Mar. 1.6	06.592 52	37.90 28	33.802 64	84.63 54	14.472 187	50.60 225			
11.6	06.540 22	37.62 10	33.738 34	84.09 78	14.285 118	48.35 241			
21.6	06.518 15	37.52 10	33.704 2	83.31 102	14.167 41	45.94 247			
31.5	06.533 56	37.62 33	33.706 40	82.29 126	14.126 43	43.47 241			
Apr. 10.5	06.589 99	37.95 58	33.746 83	81.03 150	14.169 129	41.06 226			
20.5	06.688 143	38.53 83	33.829 127	79.53 171	14.298 213	38.80 202			
30.5	06.831 186	39.36 109	33.956 169	77.82 189	14.511 294	36.78 169			
May 10.4	07.017 224	40.45 132	34.125 209	75.93 205	14.805 365	35.09 130			
20.4	07.241 258	41.77 154	34.334 245	73.88 217	15.170 428	33.79 87			
30.4	07.499 287	43.31 173	34.579 275	71.71 223	15.598 478	32.92 41			
June 9.3	07.786 307	45.04 187	34.854 299	69.48 225	16.076 515	32.51 7			
19.3	08.093 321	46.91 197	35.153 314	67.23 219	16.591 537	32.58 56			
29.3	08.414 325	48.88 201	35.467 321	65.04 210	17.128 549	33.14 102			
July 9.3	08.739 322	50.89 201	35.788 322	62.94 195	17.677 544	34.16 146			
19.2	09.061 313	52.90 196	36.110 314	60.99 175	18.221 529	35.62 187			
29.2	09.374 294	54.86 186	36.424 299	59.24 149	18.750 503	37.49 223			
Aug. 8.2	09.668 272	56.72 172	36.723 277	57.75 122	19.253 466	39.72 254			
18.2	09.940 244	58.44 154	37.000 251	56.53 91	19.719 421	42.26 280			
28.1	10.184 213	59.98 133	37.251 220	55.62 60	20.140 370	45.06 300			
Sept. 7.1	10.397 180	61.31 111	37.471 187	55.02 28	20.510 316	48.06 315			
17.1	10.577 146	62.42 88	37.658 153	54.74 3	20.826 257	51.21 323			
27.0	10.723 111	63.30 65	37.811 118	54.77 30	21.083 196	54.44 325			
Oct. 7.0	10.834 79	63.95 43	37.929 85	55.07 54	21.279 135	57.69 320			
16.9	10.913 49	64.38 23	38.014 53	55.61 74	21.414 73	60.89 310			
26.9	10.962 20	64.61 4	38.067 23	56.35 88	21.487 13	63.99 292			
Nov. 5.9	10.982 7	64.65 11	38.090 5	57.23 98	21.500 47	66.91 268			
15.9	10.975 29	64.54 26	38.085 30	58.21 102	21.453 105	69.59 238			
25.9	10.946 52	64.28 37	38.055 52	59.23 102	21.348 159	71.97 202			
Dec. 5.9	10.894 70	63.91 46	38.003 71	60.25 96	21.189 208	73.99 159			
15.8	10.824 86	63.45 54	37.932 88	61.21 87	20.981 252	75.58 112			
25.8	10.738 98	62.91 58	37.844 101	62.08 75	20.729 286	76.70 61			
35.8	10.640	62.33	37.743		20.443	77.31			
Mean Place	07.386	39.58	34.413	79.94	16.999	38.68			
Sec δ, Tan δ	1.008	+0.127	1.011	—0.150	1.993	+1.724			
a, a'	+3.1	+19.1	+3.0	+18.8	+3.9	+18.8			
b, b'	+0.01	—0.3	—0.01	—0.3	+0.11	—0.3			
Authority and Catalogue No.	N.A.	74	B.J.	81	B.J.	83			

AT UPPER TRANSIT AT GREENWICH.

Name	γ Phoenicis		η Piscium		α Eridani (<i>Achernar</i>)	
Mag. Spect.	3.40	K5	3.72	G5	0.60	B5
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 01 ^m 25	[°] —43 ['] 39	^h 01 ^m 27	[°] +14 ['] 59	^h 01 ^m 35	[°] —57 ['] 34
Jan. 0.8	22.864 ^s	89.91 ["]	47.065 ^s	31.48 ["]	10.044 ^s	88.43 ["]
10.8	22.665 ^s 199	90.39 ["] 48	46.957 ^s 108	30.99 ["] 49	09.730 ^s 314	88.82 ["] 39
20.7	22.460 ^s 205	90.39 ["] —	46.839 ^s 118	30.40 ["] 59	09.409 ^s 321	88.64 ["] 18
30.7	22.258 ^s 202	89.90 ["] 49	46.716 ^s 123	29.73 ["] 67	09.091 ^s 318	87.91 ["] 73
Feb. 9.7	22.064 ^s 194	88.94 ["] 96	46.595 ^s 121	29.02 ["] 71	08.786 ^s 305	86.64 ["] 127
	178	141	112	73	281	178
19.6	21.886 ^s	87.53 ["]	46.483 ^s	28.29 ["]	08.505 ^s	84.86 ["]
Mar. 1.6	21.733 ^s 153	85.71 ["] 182	46.388 ^s 95	27.59 ["] 70	08.257 ^s 248	82.62 ["] 224
11.6	21.612 ^s 121	83.51 ["] 220	46.316 ^s 72	26.96 ["] 63	08.051 ^s 206	79.98 ["] 264
21.6	21.529 ^s 83	80.98 ["] 253	46.276 ^s 40	26.45 ["] 51	07.896 ^s 155	76.99 ["] 299
31.5	21.492 ^s 37	78.17 ["] 281	46.273 ^s 3	26.10 ["] 35	07.799 ^s 97	73.73 ["] 326
	12	304	40	16	33	348
Apr. 10.5	21.504 ^s	75.13 ["]	46.313 ^s	25.94 ["]	07.766 ^s	70.25 ["]
20.5	21.569 ^s 65	71.93 ["] 320	46.397 ^s 84	26.02 ["] 8	07.802 ^s 36	66.64 ["] 361
30.5	21.689 ^s 120	68.63 ["] 330	46.527 ^s 130	26.36 ["] 34	07.908 ^s 106	62.97 ["] 367
May 10.4	21.862 ^s 173	65.30 ["] 333	46.702 ^s 175	26.96 ["] 60	08.084 ^s 176	59.32 ["] 365
20.4	22.087 ^s 225	62.01 ["] 329	46.919 ^s 217	27.84 ["] 88	08.328 ^s 244	55.76 ["] 356
	272	317	253	113	307	338
30.4	22.359 ^s	58.84 ["]	47.172 ^s	28.97 ["]	08.635 ^s	52.38 ["]
June 9.3	22.672 ^s 313	55.86 ["] 298	47.457 ^s 285	30.34 ["] 137	08.998 ^s 363	49.25 ["] 313
19.3	23.019 ^s 347	53.13 ["] 273	47.765 ^s 308	31.92 ["] 158	09.408 ^s 410	46.45 ["] 280
29.3	23.391 ^s 372	50.73 ["] 240	48.089 ^s 324	33.67 ["] 175	09.856 ^s 448	44.03 ["] 242
July 9.3	23.777 ^s 386	48.71 ["] 202	48.420 ^s 331	35.54 ["] 187	10.328 ^s 472	42.07 ["] 196
	392	158	331	195	485	144
19.2	24.169 ^s	47.13 ["]	48.751 ^s	37.49 ["]	10.813 ^s	40.63 ["]
29.2	24.556 ^s 387	46.03 ["] 110	49.074 ^s 323	39.46 ["] 197	11.298 ^s 485	39.73 ["] 90
Aug. 8.2	24.928 ^s 372	45.43 ["] 60	49.381 ^s 307	41.41 ["] 195	11.769 ^s 471	39.39 ["] 34
18.2	25.275 ^s 347	45.35 ["] 8	49.668 ^s 287	43.30 ["] 189	12.213 ^s 444	39.62 ["] 23
28.1	25.592 ^s 317	45.78 ["] 43	49.928 ^s 260	45.08 ["] 178	12.620 ^s 407	40.42 ["] 80
	277	92	231	163	359	133
Sept. 7.1	25.869 ^s	46.70 ["]	50.159 ^s	46.71 ["]	12.979 ^s	41.75 ["]
17.1	26.101 ^s 232	48.08 ["] 138	50.359 ^s 200	48.18 ["] 147	13.280 ^s 301	43.56 ["] 181
27.0	26.284 ^s 183	49.85 ["] 177	50.525 ^s 166	49.46 ["] 128	13.517 ^s 237	45.78 ["] 222
Oct. 7.0	26.418 ^s 134	51.94 ["] 209	50.657 ^s 132	50.55 ["] 109	13.686 ^s 169	48.32 ["] 254
16.9	26.501 ^s 83	54.25 ["] 231	50.757 ^s 100	51.43 ["] 88	13.784 ^s 98	51.09 ["] 277
	34	245	69	68	29	288
26.9	26.535 ^s	56.70 ["]	50.826 ^s	52.11 ["]	13.813 ^s	53.97 ["]
Nov. 5.9	26.522 ^s 13	59.17 ["] 247	50.866 ^s 40	52.61 ["] 50	13.774 ^s 39	56.85 ["] 288
15.9	26.466 ^s 56	61.58 ["] 241	50.877 ^s 11	52.92 ["] 31	13.671 ^s 103	59.60 ["] 275
25.9	26.372 ^s 94	63.81 ["] 223	50.862 ^s 15	53.06 ["] 14	13.511 ^s 160	62.12 ["] 252
Dec. 5.9	26.244 ^s 128	65.78 ["] 197	50.823 ^s 39	53.04 ["] 2	13.302 ^s 209	64.31 ["] 219
	156	163	62	17	252	177
15.8	26.088 ^s	67.41 ["]	50.761 ^s	52.87 ["]	13.050 ^s	66.08 ["]
25.8	25.910 ^s 178	68.63 ["] 122	50.680 ^s 81	52.57 ["] 30	12.766 ^s 284	67.35 ["] 127
35.8	25.716 ^s 194	69.41 ["] 78	50.582 ^s 98	52.14 ["] 43	12.459 ^s 307	68.09 ["] 74
Mean Place	22.247	76.17	47.213	26.57	08.841	72.39
Sec δ , Tan δ	1.383	—0.955	1.035	+0.268	1.866	—1.575
a, a'	+2.6	+18.7	+3.2	+18.6	+2.2	+18.3
b, b'	—0.06	—0.4	+0.02	—0.4	—0.10	—0.4
Authority and Catalogue No.	A.N.	85	B.J.	88	B.J.	06

† Second transit, Oct. 16.

AT UPPER TRANSIT AT GREENWICH.

Name Mag. Spect.	ν Piscium		ο Piscium		ζ Ceti	
	4·68	Ko	4·50	Ko	3·92	Ko
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 01 ^m 37	[°] +5 [′] 08	^h 01 ^m 41	[°] +8 [′] 48	^h 01 ^m 48	[°] -10 [′] 40
Jan. 0·8	^s 50·237 ₁₀₂	[″] 22·84 ₅₉	^s 44·782 ₁₀₂	[″] 43·78 ₅₄	^s 03·405 ₁₀₇	[″] 33·89 ₇₅
10·8	50·135 ₁₁₃	22·25 ₅₈	44·680 ₁₁₄	43·24 ₅₇	03·298 ₁₁₉	34·64 ₅₆
20·7	50·022 ₁₁₉	21·67 ₅₄	44·566 ₁₂₁	42·67 ₅₇	03·179 ₁₂₆	35·20 ₃₅
30·7	49·903 ₁₁₈	21·13 ₄₉	44·445 ₁₂₁	42·10 ₅₅	03·053 ₁₂₇	35·55 ₁₃
Feb. 9·7	49·785 ₁₁₂	20·64 ₄₀	44·324 ₁₁₆	41·55 ₅₀	02·926 ₁₂₁	35·68 ₁₀
19·7	49·673 ₉₈	20·24 ₂₈	44·208 ₁₀₁	41·05 ₄₃	02·805 ₁₀₈	35·58 ₃₅
Mar. 1·6	49·575 ₇₆	19·96 ₁₅	44·107 ₈₀	40·62 ₃₂	02·697 ₈₈	35·23 ₆₀
11·6	49·499 ₄₇	19·81 ₂	44·027 ₅₁	40·30 ₁₇	02·609 ₆₁	34·63 ₈₅
21·6	49·452 ₁₂	19·83 ₂₂	43·976 ₁₅	40·13 ₁	02·548 ₂₇	33·78 ₁₁₁
31·5	49·440 ₂₈	20·05 ₄₃	43·961 ₂₄	40·14 ₂₁	02·521 ₁₂	32·67 ₁₃₅
Apr. 10·5	49·468 ₇₀	20·48 ₆₇	43·985 ₆₈	40·35 ₄₄	02·533 ₅₄	31·32 ₁₅₈
20·5	49·538 ₁₁₅	21·15 ₉₁	44·053 ₁₁₄	40·79 ₆₈	02·587 ₉₉	29·74 ₁₈₀
30·5	49·653 ₁₅₉	22·06 ₁₁₄	44·167 ₁₅₈	41·47 ₉₂	02·686 ₁₄₂	27·94 ₁₉₉
May 10·4	49·812 ₂₀₁	23·20 ₁₃₇	44·325 ₂₀₀	42·39 ₁₁₆	02·828 ₁₈₅	25·95 ₂₁₄
20·4	50·013 ₂₃₈	24·57 ₁₅₆	44·525 ₂₃₇	43·55 ₁₃₈	03·013 ₂₂₄	23·81 ₂₂₄
30·4	50·251 ₂₆₉	26·13 ₁₇₃	44·762 ₂₇₀	44·93 ₁₅₈	03·237 ₂₅₈	21·57 ₂₃₁
June 9·4	50·520 ₂₉₄	27·86 ₁₈₆	45·032 ₂₉₆	46·51 ₁₇₃	03·495 ₂₈₄	19·26 ₂₃₂
19·3	50·814 ₃₁₁	29·72 ₁₉₅	45·328 ₃₁₂	48·24 ₁₈₆	03·779 ₃₀₄	16·94 ₂₂₇
29·3	51·125 ₃₂₀	31·67 ₁₉₇	45·640 ₃₂₃	50·10 ₁₉₁	04·083 ₃₁₇	14·67 ₂₁₅
July 9·3	51·445 ₃₂₃	33·64 ₁₉₆	45·963 ₃₂₅	52·01 ₁₉₃	04·400 ₃₂₂	12·52 ₁₉₉
19·2	51·768 ₃₁₇	35·60 ₁₈₉	46·288 ₃₂₀	53·94 ₁₉₁	04·722 ₃₁₈	10·53 ₁₇₇
29·2	52·085 ₃₀₃	37·49 ₁₇₈	46·608 ₃₀₇	55·85 ₁₈₂	05·040 ₃₀₇	08·76 ₁₅₁
Aug. 8·2	52·388 ₂₈₅	39·27 ₁₆₂	46·915 ₂₈₈	57·67 ₁₇₀	05·347 ₂₉₀	07·25 ₁₂₁
18·2	52·673 ₂₆₁	40·89 ₁₄₂	47·203 ₂₆₅	59·37 ₁₅₅	05·637 ₂₆₈	06·04 ₈₉
28·1	52·934 ₂₃₃	42·31 ₁₂₁	47·468 ₂₃₈	60·92 ₁₃₅	05·905 ₂₄₁	05·15 ₅₄
Sept. 7·1	53·167 ₂₀₃	43·52 ₉₇	47·706 ₂₀₈	62·27 ₁₁₄	06·146 ₂₁₁	04·61 ₂₀
17·1	53·370 ₁₇₁	44·49 ₇₃	47·914 ₁₇₆	63·41 ₉₃	06·357 ₁₇₈	04·41 ₁₂
27·1	53·541 ₁₃₈	45·22 ₅₀	48·090 ₁₄₄	64·34 ₇₀	06·535 ₁₄₅	04·53 ₄₂
Oct. 7·0	¹⁶ 53·679 ₁₀₆	45·72 ₂₇	48·234 ₁₁₂	65·04 ₄₈	06·680 ₁₁₂	04·95 ₆₉
17·0	53·785 ₇₆	45·99 ₇	48·346 ₈₁	65·52 ₂₉	06·792 ₇₉	05·64 ₉₀
26·9	53·861 ₄₇	46·06 ₁₁	48·427 ₅₂	65·81 ₁₀	06·871 ₄₉	06·54 ₁₀₆
Nov. 5·9	53·908 ₁₉	45·95 ₂₇	48·479 ₂₄	65·91 ₅	06·920 ₁₉	07·60 ₁₁₆
15·9	53·927 ₈	45·68 ₃₈	48·503 ₃	65·86 ₁₉	06·939 ₉	08·76 ₁₂₀
25·9	53·919 ₃₂	45·30 ₄₇	48·500 ₂₈	65·67 ₃₁	06·930 ₃₅	09·96 ₁₁₉
Dec. 5·9	53·887 ₅₄	44·83 ₅₄	48·472 ₅₂	65·36 ₄₀	06·895 ₅₈	11·15 ₁₁₂
15·8	53·833 ₇₅	44·29 ₅₈	48·420 ₇₂	64·96 ₄₇	06·837 ₇₉	12·27 ₁₀₁
25·8	53·758 ₉₂	43·71 ₆₀	48·348 ₉₁	64·49 ₅₂	06·758 ₉₇	13·28 ₈₇
35·8	53·666	43·11	48·257	63·97	06·661	14·15
Mean Place	50·239	20·99	44·793	40·54	03·191	30·77
Sec δ, Tan δ	1·004	+0·090	1·012	+0·155	1·018	-0·189
a, a'	+3·1	+18·2	+3·2	+18·1	+3·0	+17·9
b, b'	+0·01	-0·4	+0·01	-0·4	-0·01	-0·5
Authority and Catalogue No.	A.N.	99	B.J.	104	B.J.	109

† Second transit, Oct. 16.

† First transit, Oct. 17.

AT UPPER TRANSIT AT GREENWICH.

Name	α Trianguli		ϵ Cassiopeiæ		β Arietis	
	3.58	F5	3.44	B3	2.72	A5
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 01 ^m 49	[°] +29 ['] 14	^h 01 ^m 49	[°] +63 ['] 19	^h 01 ^m 50	[°] +20 ['] 28
Jan. 0.8	08.344 ^s	46.48 ["]	24.05 ^s	70.96 ["]	49.337 ^s	24.78 ["]
10.8	08.222 ¹²²	46.33 ¹⁵	23.71 ³⁴	71.68 ⁷²	49.229 ¹⁰⁸	24.45 ³³
20.7	08.083 ¹³⁹	45.93 ⁴⁰	23.35 ³⁶	71.86 ¹⁸	49.106 ¹²³	23.98 ⁴⁷
30.7	07.934 ¹⁴⁹	45.30 ⁶³	22.97 ³⁸	71.51 ³⁵	48.973 ¹³³	23.37 ⁶¹
Feb. 9.7	07.783 ¹⁵¹	44.48 ⁸²	22.59 ³⁸	70.64 ⁸⁷	48.838 ¹³⁵	22.65 ⁷²
19.7	07.639 ¹⁴⁴	43.49 ⁹⁹	22.24 ³⁵	69.29 ¹³⁵	48.708 ¹³⁰	21.86 ⁷⁹
Mar. 1.6	07.510 ¹²⁹	42.38 ¹¹¹	21.92 ³²	67.53 ¹⁷⁶	48.592 ¹¹⁶	21.03 ⁸³
11.6	07.406 ¹⁰⁴	41.21 ¹¹⁷	21.66 ²⁶	65.44 ²⁰⁹	48.498 ⁹⁴	20.22 ⁸¹
21.6	07.336 ⁷⁰	40.04 ¹¹⁷	21.47 ¹⁹	63.11 ²³³	48.435 ⁶³	19.47 ⁷⁵
31.6	07.307 ²⁹	38.94 ¹¹⁰	21.36 ¹¹	60.65 ²⁴⁶	48.409 ²⁶	18.83 ⁶⁴
Apr. 10.5	07.324 ¹⁷	37.96 ⁹⁸	21.34 ²	58.16 ²⁴⁹	48.425 ¹⁶	18.35 ⁴⁸
20.5	07.392 ⁶⁸	37.16 ⁸⁰	21.42 ⁸	55.74 ²⁴²	48.488 ⁶³	18.07 ²⁸
30.5	07.511 ¹¹⁹	36.60 ⁵⁶	21.60 ¹⁸	53.49 ²²⁵	48.599 ¹¹¹	18.02 ⁵
May 10.4	07.680 ¹⁶⁹	36.31 ²⁹	21.87 ²⁷	51.50 ¹⁹⁹	48.758 ¹⁵⁹	18.24 ²²
20.4	07.897 ²¹⁷	36.33 ²	22.22 ³⁵	49.85 ¹⁶⁵	48.961 ²⁰³	18.73 ⁴⁹
30.4	08.157 ²⁶⁰	36.65 ³²	22.65 ⁴³	48.59 ¹²⁶	49.205 ²⁴⁴	19.49 ⁷⁶
June 9.4	08.453 ²⁹⁶	37.28 ⁶³	23.14 ⁴⁹	47.75 ⁸⁴	49.484 ²⁷⁹	20.52 ¹⁰³
19.3	08.777 ³²⁴	38.21 ⁹³	23.68 ⁵⁴	47.38 ³⁷	49.790 ³⁰⁶	21.78 ¹²⁶
29.3	09.121 ³⁴⁴	39.42 ¹²¹	24.25 ⁵⁷	47.49 ¹¹	50.115 ³²⁵	23.27 ¹⁴⁹
July 9.3	09.477 ³⁵⁶	40.88 ¹⁴⁶	24.85 ⁶⁰	48.07 ⁵⁸	50.451 ³³⁶	24.92 ¹⁶⁵
19.3	09.835 ³⁵⁸	42.55 ¹⁶⁷	25.46 ⁶¹	49.10 ¹⁰³	50.791 ³⁴⁰	26.70 ¹⁷⁸
29.2	10.188 ³⁵³	44.39 ¹⁸⁴	26.06 ⁶⁰	50.56 ¹⁴⁶	51.126 ³³⁵	28.57 ¹⁸⁷
Aug. 8.2	10.529 ³⁴¹	46.35 ¹⁹⁶	26.63 ⁵⁷	52.43 ¹⁸⁷	51.450 ³²⁴	30.48 ¹⁹¹
18.2	10.850 ³²¹	48.39 ²⁰⁴	27.18 ⁵⁵	54.65 ²²²	51.755 ³⁰⁵	32.37 ¹⁸⁹
28.1	11.147 ²⁹⁷	50.45 ²⁰⁶	27.69 ⁵¹	57.18 ²⁵³	52.037 ²⁸²	34.22 ¹⁸⁵
Sept. 7.1	11.415 ²⁶⁸	52.51 ²⁰⁶	28.15 ⁴⁶	59.97 ²⁷⁹	52.292 ²⁵⁵	35.98 ¹⁷⁶
17.1	11.651 ²³⁶	54.51 ²⁰⁰	28.55 ⁴⁰	62.95 ²⁹⁸	52.517 ²²⁵	37.62 ¹⁶⁴
27.1	11.854 ²⁰³	56.43 ¹⁹²	28.89 ³⁴	66.09 ³¹⁴	52.710 ¹⁹³	39.11 ¹⁴⁹
Oct. 7.0	12.022 ¹⁶⁸	58.23 ¹⁸⁰	29.17 ²⁸	69.31 ³²²	52.871 ¹⁶¹	40.45 ¹³⁴
17.0	12.156 ¹³⁴	59.90 ¹⁶⁷	29.38 ²¹	72.55 ³²⁴	52.999 ¹²⁸	41.61 ¹¹⁶
26.9	12.256 ¹⁰⁰	61.41 ¹⁵¹	29.53 ¹⁵	75.75 ³²⁰	53.096 ⁹⁷	42.59 ⁹⁸
Nov. 5.9	12.322 ⁶⁶	62.74 ¹³³	29.60 ⁷	78.84 ³⁰⁹	53.162 ⁶⁶	43.39 ⁸⁰
15.9	12.356 ³⁴	63.88 ¹¹⁴	29.60 [—]	81.76 ²⁹²	53.198 ³⁶	44.02 ⁶³
25.9	12.358 ²	64.81 ⁹³	29.54 ⁶	84.42 ²⁶⁶	53.204 ⁶	44.47 ⁴⁵
Dec. 5.9	12.330 ²⁸	65.53 ⁷²	29.40 ¹⁴	86.76 ²³⁴	53.182 ²²	44.74 ²⁷
15.8	12.272 ⁵⁸	66.01 ⁴⁸	29.20 ²⁰	88.73 ¹⁹⁷	53.134 ⁴⁸	44.84 ¹⁰
25.8	12.187 ⁸⁵	66.25 ²⁴	28.94 ²⁶	90.25 ¹⁵²	53.061 ⁷³	44.76 ⁸
35.8	12.079 ¹⁰⁸	66.24 ¹	28.64 ³⁰	91.28 ¹⁰³	52.966 ⁹⁵	44.52 ²⁴
Mean Place	08.475	36.37	24.478	52.43	49.390	17.40
Sec δ , Tan δ	1.146	+0.560	2.228	+1.991	1.067	+0.373
a, a'	+3.4	+17.8	+4.3	+17.8	+3.3	+17.7
b, b'	+0.03	-0.5	+0.12	-0.5	+0.02	-0.5
Authority and Catalogue No.	B.J.	110	B.J.	111	B.J.	114

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name	α Hydri		ν Ceti		γ^1 Andromedæ	
	3.02	Fo	4.18	Ma	2.28	Ko
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ₀₁ ^m ₅₆	[°] ₋₆₁ ['] ₅₃	^h ₀₁ ^m ₅₆	[°] ₋₂₁ ['] ₂₄	^h ₀₁ ^m ₅₉	[°] ₊₄₁ ['] ₅₉
Jan. 0.8	37.47 ^s	93.42 ["]	45.597 ^s	47.23 ["]	39.112 ^s	72.34 ["]
10.8	37.10 37	94.02 60	45.476 ^s 121	48.08 85	38.956 ^s 156	72.58 ["] 24
20.7	36.71 39	94.05 3	45.341 ^s 135	48.64 56	38.779 ^s 177	72.46 ["] 12
30.7	36.32 39	93.49 56	45.199 ^s 142	48.87 23	38.588 ^s 191	71.98 ["] 48
Feb. 9.7	35.93 39	92.36 113	45.056 ^s 143	48.78 9	38.393 ^s 195	71.17 ["] 81
	36 165		139 42		188 110	
19.7	35.57 33	90.71 214	44.917 ^s 126	48.36 75	38.205 ^s 170	70.07 ["] 136
Mar. 1.6	35.24 28	88.57 258	44.791 ^s 105	47.61 106	38.035 ^s 142	68.71 ["] 153
11.6	34.96 23	85.99 294	44.686 ^s 78	46.55 137	37.893 ^s 103	67.18 ["] 164
21.6	34.73 17	83.05 326	44.608 ^s 44	45.18 166	37.790 ^s 55	65.54 ["] 167
31.6	34.56 10	79.79 351	44.564 ^s 4	43.52 192	37.735 ^s	63.87 ["] 161
Apr. 10.5	34.46 2	76.28 365	44.560 ^s 39	41.60 215	37.735 ^s 59	62.26 ["] 149
20.5	34.44 6	72.63 374	44.599 ^s 85	39.45 235	37.794 ^s 119	60.77 ["] 129
30.5	34.50 14	68.89 375	44.684 ^s 131	37.10 251	37.913 ^s 178	59.48 ["] 103
May 10.4	34.64 22	65.14 367	44.815 ^s 176	34.59 262	38.091 ^s 233	58.45 ["] 72
20.4	34.86 29	61.47 350	44.991 ^s 217	31.97 267	38.324 ^s 284	57.73 ["] 38
30.4	35.15 36	57.97 328	45.208 ^s 253	29.30 266	38.608 ^s 327	57.35 ["] 2
June 9.4	35.51 42	54.69 296	45.461 ^s 284	26.64 259	38.935 ^s 361	57.33 ["] 34
19.3	35.93 47	51.73 256	45.745 ^s 307	24.05 245	39.296 ^s 385	57.67 ["] 71
29.3	36.40 50	49.17 212	46.052 ^s 321	21.60 226	39.681 ^s 400	58.38 ["] 104
July 9.3	36.90 52	47.05 161	46.373 ^s 329	19.34 200	40.081 ^s 406	59.42 ["] 136
19.3	37.42 53	45.44 106	46.702 ^s 328	17.34 170	40.487 ^s 402	60.78 ["] 164
29.2	37.95 53	44.38 47	47.030 ^s 320	15.64 134	40.889 ^s 390	62.42 ["] 188
Aug. 8.2	38.48 51	43.91 11	47.350 ^s 303	14.30 95	41.279 ^s 371	64.30 ["] 208
18.2	38.99 47	44.02 70	47.653 ^s 282	13.35 55	41.650 ^s 345	66.38 ["] 222
28.1	39.46 42	44.72 126	47.935 ^s 255	12.80 13	41.995 ^s 314	68.60 ["] 233
Sept. 7.1	39.88 37	45.98 177	48.190 ^s 223	12.67 28	42.309 ^s 279	70.93 ["] 239
17.1	40.25 30	47.75 222	48.413 ^s 190	12.95 66	42.588 ^s 243	73.32 ["] 241
27.1	40.55 22	49.97 258	48.603 ^s 155	13.61 100	42.831 ^s 204	75.73 ["] 238
Oct. 7.0	40.77 14	52.55 285	48.758 ^s 120	14.61 128	43.035 ^s 165	78.11 ["] 230
17.0	40.91 6	55.40 299	48.878 ^s 84	15.89 150	43.200 ^s 125	80.41 ["] 220
26.9	40.97 2	58.39 303	48.962 ^s 50	17.39 166	43.325 ^s 85	82.61 ["] 206
Nov. 5.9	40.95 9	61.42 294	49.012 ^s 17	19.05 172	43.410 ^s 45	84.67 ["] 188
15.9	40.86 17	64.36 273	49.029 ^s 13	20.77 171	43.455 ^s 5	86.55 ["] 166
25.9	40.69 23	67.09 241	49.016 ^s 42	22.48 163	43.460 ^s 33	88.21 ["] 141
Dec. 5.9	40.46 28	69.50 199	48.974 ^s 68	24.11 149	43.427 ^s 71	89.62 ["] 111
15.8	40.18 33	71.49 152	48.906 ^s 91	25.60 128	43.356 ^s 105	90.73 ["] 79
25.8	39.85 36	73.01 97	48.815 ^s 111	26.88 103	43.251 ^s 137	91.52 ["] 46
35.8	39.49	73.98	48.704 ^s	27.91	43.114 ^s	91.98 ["]
Mean Place	35.776	77.99	45.198	41.10	39.256	58.40
Sec δ , Tan δ	2.123	-1.873	1.074	-0.392	1.346	+0.900
α, α'	+1.9	+17.5	+2.8	+17.5	+3.7	+17.4
δ, δ'	-0.11	-0.5	-0.02	-0.5	+0.05	-0.5
Authority and Catalogue No.	B.J.	119	B.J.	120	B.J.	124

AT UPPER TRANSIT AT GREENWICH.

Name	α Arietis		β Trianguli		ξ^1 Ceti	
Mag. Spect.	2.23	K2	3.08	A5	4.54	G5
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 02 ^m 03	[°] +23 ['] 08	^h 02 ^m 05	[°] +34 ['] 39	^h 02 ^m 09	[°] +8 ['] 31
Jan. 0.8	16.678 ^s	21.81	25.713 ^s	54.62	20.489 ^s	30.42
10.8	16.571 ¹⁰⁷	21.59 22	25.584 ¹²⁹	54.71 ⁹	20.395 ⁹⁴	29.90 52
20.8	16.446 ¹²⁵	21.20 39	25.434 ¹⁵⁰	54.51 ²⁰	20.283 ¹¹²	29.36 54
30.7	16.308 ¹³⁸	20.65 55	25.271 ¹⁶³	54.03 48	20.158 ¹²⁵	28.83 53
Feb. 9.7	16.166 ¹⁴²	19.96 69	25.102 ¹⁶⁹	53.28 75	20.028 ¹³⁰	28.33 50
	139	79	165	97	128	45
19.7	16.027	19.17 86	24.937	52.31	19.900	27.88
Mar. 1.6	15.900 ¹²⁷	18.31 86	24.786 ¹⁵¹	51.17 ¹¹⁴	19.781 ¹¹⁹	27.50 38
11.6	15.794 ¹⁰⁶	17.43 88	24.659 ¹²⁷	49.90 ¹²⁷	19.681 ¹⁰⁰	27.22 28
21.6	15.717 ⁷⁷	16.59 84	24.566 ⁹³	48.56 ¹³⁴	19.607 ⁷⁴	27.08 14
31.6	15.678 ³⁹	15.82 77	24.516 ⁵⁰	47.24 ¹³²	19.565 ⁴²	27.10 2
	5	63	2	124	2	21
Apr. 10.5	15.683	15.19 45	24.514	46.00	19.563	27.31
20.5	15.734 ⁵¹	14.74 22	24.565 ⁵¹	44.90 ¹¹⁰	19.604 ⁴¹	27.74 43
30.5	15.835 ¹⁰¹	14.52 2	24.671 ¹⁰⁶	44.00 ⁹⁰	19.691 ⁸⁷	28.38 64
May 10.5	15.984 ¹⁴⁹	14.54 2	24.831 ¹⁶⁰	43.35 ⁶⁵	19.823 ¹³²	29.26 88
20.4	16.180 ¹⁹⁶	14.83 29	25.043 ²¹²	42.99 ³⁶	19.999 ¹⁷⁶	30.36 110
	238	56	259	5	216	131
30.4	16.418	15.39 84	25.302 ²⁹⁸	42.94 28	20.215 ²⁵⁰	31.67 150
June 9.4	16.693 ²⁷⁵	16.23 84	25.600 ³³¹	43.22 60	20.465 ²⁸¹	33.17 164
19.3	16.997 ³⁰⁴	17.32 109	25.931 ³⁵⁴	43.82 92	20.746 ³⁰²	34.81 175
29.3	17.322 ³²⁵	18.63 131	26.285 ³⁶⁹	44.74 ¹¹⁹	21.048 ³¹⁶	36.56 184
July 9.3	17.661 ³³⁹	20.14 167	26.654 ³⁷⁶	45.93 ¹⁴⁵	21.364 ³²³	38.40 185
	344					
19.3	18.005	21.81 178	27.030 ³⁷³	47.38 167	21.687 ³²¹	40.25 182
29.2	18.347 ³⁴²	23.59 185	27.403 ³⁶³	49.05 184	22.008 ³¹⁴	42.07 174
Aug. 8.2	18.679 ³³²	25.44 186	27.766 ³⁴⁵	50.89 197	22.322 ²⁹⁹	43.81 162
18.2	18.995 ³¹⁶	27.30 185	28.111 ³²³	52.86 207	22.621 ²⁸⁰	45.43 147
28.2	19.289 ²⁹⁴	29.15 179	28.434 ²⁹⁵	54.93 211	22.901 ²⁵⁷	46.90 128
	269					
Sept. 7.1	19.558	30.94 169	28.729 ²⁶⁴	57.04 211	23.158 ²³⁰	48.18 107
17.1	19.798 ²⁴⁰	32.63 158	28.993 ²³¹	59.15 208	23.388 ²⁰⁰	49.25 86
27.1	20.006 ²⁰⁸	34.21 144	29.224 ¹⁹⁶	61.23 201	23.588 ¹⁷¹	50.11 63
Oct. 7.0	20.183 ¹⁷⁷	35.65 128	29.420 ¹⁶¹	63.24 191	23.759 ¹⁴⁰	50.74 42
17.0	20.328 ¹⁴⁵	36.93 112	29.581 ¹²⁵	65.15 179	23.899 ¹¹⁰	51.16 22
	113					
26.9	20.441 ⁸¹	38.05 95	29.706 ⁸⁹	66.94 164	24.009 ⁸⁰	51.38 4
Nov. 5.9	20.522 ⁵⁰	39.00 78	29.795 ⁵⁴	68.58 146	24.089 ⁵⁰	51.42 11
15.9	20.572 ¹⁸	39.78 60	29.849 ¹⁸	70.04 127	24.139 ²²	51.31 24
25.9	20.590 ¹¹	40.38 42	29.867 ¹⁷	71.31 104	24.161 ⁶	51.07 34
Dec. 5.9	20.579 ⁴⁰	40.80 24	29.850 ⁵⁰	72.35 80	24.155 ³²	50.73 42
15.9	20.539 ⁶⁷	41.04 6	29.800 ⁸³	73.15 53	24.123 ⁵⁹	50.31 49
25.8	20.472 ⁹²	41.10 12	29.717 ¹¹¹	73.68 25	24.064 ⁸¹	49.82 51
35.8	20.380	40.98	29.606	73.93	23.983	49.31
Mean Place	16.672	13.28	25.767	42.61	20.340	26.42
Sec δ , Tan δ	1.087	+0.427	1.216	+0.691	1.011	+0.150
a, a'	+3.4	+17.2	+3.6	+17.1	+3.2	+16.9
b, b'	+0.02	-0.5	+0.04	-0.5	+0.01	-0.5
Authority and Catalogue No.	B. J.	125	B. J.	126	N. A.	130

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name	67 Ceti		ϕ Eridani		θ Arietis	
Mag. Spect.	5.70	G5	3.78	B8	5.69	Ao
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 02 ^m 13	[°] —6 ['] 43	^h 02 ^m 14	[°] —51 ['] 49	^h 02 ^m 14	[°] +19 ['] 34
Jan. 0.8	32.713 ^s	82.15	03.931 ^s	63.91	17.022 ^s	66.10
10.8	32.615 ^s 98	82.95 80	03.679 ^s 252	64.86 95	16.923 ^s 99	65.84 26
20.8	32.500 ^s 115	83.59 64	03.408 ^s 271	65.29 43	16.804 ^s 119	65.45 39
30.7	32.373 ^s 127	84.05 46	03.127 ^s 281	65.17 12	16.671 ^s 133	64.95 50
Feb. 9.7	32.241 ^s 132	84.33 28	02.846 ^s 281	64.51 66	16.532 ^s 139	64.35 60
	131	8	272	118	139	68
19.7	32.110 ^s	84.41	02.574 ^s	63.33	16.393 ^s	63.67
Mar. 1.7	31.988 ^s 122	84.27 14	02.321 ^s 253	61.67 166	16.264 ^s 129	62.97 70
11.6	31.883 ^s 105	83.91 36	02.098 ^s 223	59.56 211	16.153 ^s 111	62.27 70
21.6	31.802 ^s 81	83.31 60	01.913 ^s 185	57.05 251	16.070 ^s 83	61.61 66
31.6	31.753 ^s 49	82.47 84	01.775 ^s 138	54.19 286	16.022 ^s 48	61.05 56
	11	109	84	313	6	42
Apr. 10.5	31.742 ^s	81.38	01.691 ^s	51.06	16.016 ^s	60.63
20.5	31.773 ^s 31	80.07 131	01.667 ^s 24	47.70 336	16.055 ^s 39	60.39 24
30.5	31.848 ^s 75	78.54 153	01.705 ^s 38	44.20 350	16.142 ^s 87	60.36 3
May 10.5	31.967 ^s 119	76.80 174	01.807 ^s 102	40.62 358	16.277 ^s 135	60.57 21
20.4	32.130 ^s 163	74.89 191	01.973 ^s 166	37.05 357	16.459 ^s 182	61.03 46
	204	205	226	349	224	71
30.4	32.334 ^s	72.84	02.199 ^s	33.56	16.683 ^s	61.74
June 9.4	32.573 ^s 239	70.70 214	02.480 ^s 281	30.24 332	16.944 ^s 261	62.69 95
19.4	32.843 ^s 270	68.51 219	02.810 ^s 330	27.16 308	17.235 ^s 291	63.87 118
29.3	33.136 ^s 293	66.33 218	03.180 ^s 370	24.39 277	17.549 ^s 314	65.24 137
July 9.3	33.444 ^s 308	64.21 212	03.581 ^s 401	22.02 237	17.878 ^s 329	66.78 154
	317	199	420	192	336	166
19.3	33.761 ^s	62.22	04.001 ^s	20.10	18.214 ^s	68.44
29.2	34.078 ^s 317	60.40 182	04.429 ^s 428	18.68 142	18.550 ^s 336	70.18 174
Aug. 8.2	34.388 ^s 310	58.80 160	04.855 ^s 426	17.81 87	18.878 ^s 328	71.95 177
18.2	34.685 ^s 297	57.46 134	05.268 ^s 413	17.50 31	19.192 ^s 314	73.72 177
28.2	34.964 ^s 279	56.42 104	05.657 ^s 389	17.76 26	19.487 ^s 295	75.43 171
	255	73	355	82	270	163
Sept. 7.1	35.219 ^s	55.69	06.012 ^s	18.58	19.757 ^s	77.06
17.1	35.448 ^s 229	55.29 40	06.325 ^s 313	19.94 136	20.001 ^s 244	78.57 151
27.1	35.648 ^s 200	55.21 8	06.589 ^s 264	21.77 183	20.216 ^s 215	79.94 137
Oct. 7.1	35.817 ^s 169	55.41 20	06.800 ^s 211	24.01 224	20.400 ^s 184	81.15 121
17.0	35.955 ^s 138	55.90 49	06.954 ^s 154	26.56 255	20.553 ^s 153	82.20 105
	25	72	96	277	122	89
26.9	36.062 ^s	56.62	07.050 ^s †	29.33	20.675 ^s †	83.09
Nov. 5.9	36.138 ^s 76	57.51 89	07.087 ^s 37	32.20 287	20.766 ^s 91	83.81 72
15.9	36.184 ^s 46	58.52 101	07.067 ^s 20	35.06 286	20.827 ^s 61	84.36 55
25.9	36.201 ^s 17	59.61 109	06.993 ^s 74	37.79 273	20.856 ^s 29	84.76 40
Dec. 5.9	36.190 ^s 11	60.72 111	06.869 ^s 124	40.28 249	20.855 ^s 1	85.00 24
	38	107	169	217	30	9
15.9	36.152 ^s	61.79	06.700 ^s	42.45	20.825 ^s	85.09
25.8	36.089 ^s 63	62.80 101	06.493 ^s 207	44.21 176	20.767 ^s 58	85.04 5
35.8	36.004 ^s 85	63.69 89	06.256 ^s 237	45.49 128	20.684 ^s 83	84.86 18
Mean Place	32.402	81.32	02.661	51.21	16.927	58.45
Sec δ , Tan δ	1.007	—0.118	1.618	—1.272	1.061	+0.356
a, a'	+3.0	+16.7	+2.1	+16.7	+3.3	+16.7
b, b'	—0.01	—0.6	—0.07	—0.6	+0.02	—0.6
Authority and Catalogue No.	B.J.	133	A.N.	134	A.N.	135

† Second transit, Oct. 26.

APPARENT PLACES OF STARS, 1931.

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AT UPPER TRANSIT AT GREENWICH.

Name Mag. Spect.	o Ceti (<i>Mira</i>)		κ Fornacis		δ Hydri	
	Var.	Md	5·37	F5	4·26	A2
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
Mean Solar Date						
	^h 02 ^m 15	^h —3 ^m 16	^h 02 ^m 19	^h —24 ^m 07	^h 02 ^m 20	^h —68 ^m 57
Jan. 0·8	51°772 ^s	83°59	23°619 ^s	50°75	33°64 ^s	97°72
10·8	51°676	84°35	23°497	51°77	33°11	98°56
20·8	51°564	84°96	23°357	52°47	32°55	98°79
30·7	51°438	85°46	23°205	52°82	31°98	98°43
Feb. 9·7	51°308	85°80	23°048	52°81	31°41	97°48
19·7	51°176	85°98	22°892	52°44	30°87	95°97
Mar. 1·7	51°054	85°97	22°746	51°72	30°37	93°94
11·6	50°949	85°75	22°618	50°65	29°91	91°46
21·6	50°867	85°33	22°515	49°26	29°52	88°56
31·6	50°818	84°69	22°445	47°56	29°21	85°34
Apr. 10·5	50°806	83°80	22°414	45°57	28°98	81°85
20·5	50°836	82°68	22°426	43°33	28°86	78°17
30·5	50°909	81°36	22°485	40°89	28°83	74°38
May 10·5	51°032	79°84	22°591	38°28	28°91	70°57
20·4	51°192	78°12	22°744	35°55	29°09	66°82
30·4	51°395	76°23	22°940	32°77	29°37	63°21
June 9·4	51°635	74°22	23°176	30°00	29°75	59°81
19·4	51°905	72°16	23°446	27°30	30°20	56°72
29·3	52°198	70°07	23°742	24°74	30°73	54°01
July 9·3	52°503	68°02	24°057	22°39	31°32	51°75
19·3	52°819	66°07	24°384	20°30	31°94	49°99
29·2	53°136	64°25	24°714	18°53	32°60	48°79
Aug. 8·2	53°448	62°61	25°039	17°14	33°26	48°17
18·2	53°744	61°21	25°353	16°15	33°90	48°16
28·2	54°022	60°06	25°649	15°59	34°52	48°77
Sept. 7·1	54°279	59°22	25°921	15°48	35°07	49°95
17·1	54°509	58°68	26°164	15°80	35°57	51°68
27·1	54°710	58°44	26°376	16°53	35°99	53°90
Oct. 7·1	54°882	58°47	26°554	17°63	36°30	56°51
17·0	55°022	58°75	26°697	19°05	36°52	59°43
27·0	55°133†	59°27	26°804†	20°72	36°63†	62°54
Nov. 5·9	55°212	59°97	26°876	22°56	36°64	65°71
15·9	55°263	60°80	26°913	24°48	36°53	68°82
25·9	55°284	61°71	26°917	26°41	36°33	71°75
Dec. 5·9	55°276	62°66	26°889	28°26	36°03	74°38
15·9	55°244	63°61	26°831	29°96	35°65	76°62
25·8	55°185	64°51	26°746	31°45	35°20	78°38
35·8	55°103	65°33	26°636	32°67	34°69	79°59
Mean Place	51°482	83°95	23°052	44°93	30°907	83°09
Sec δ, Tan δ	1°002	—0°057	1°096	—0°448	2°787	—2°601
a, a'	+3°0	+16°6	+2°7	+16°4	+1°1	+16°4
b, b'	0°00	—0°6	—0°02	—0°6	—0°14	—0°6
Authority and Catalogue No.	A.E.	136	A.N.	137	N.A.	138

† Second transit, Oct. 26.

† First transit, Oct. 27.

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name	ξ Ceti			ν Ceti			δ Ceti		
	Mag. Spect.		Ao	5.04		G5	4.04		B2
	Mean Solar Date	R.A.	Dec.	R.A.	Dec.		R.A.	Dec.	
		^h 02 ^m 24	^s +8 ^o 09	^h 02 ^m 32	^s +5 ^o 17		^h 02 ^m 35	^s +0 ^o 01	
Jan. 0.8	29.431	89	10.66	15.278	38.96	56.939	56.90		
10.8	29.342	110	10.14	15.191	38.37	56.852	56.18		
20.8	29.232	124	09.62	15.083	37.80	56.745	55.55		
30.7	29.108	132	09.11	14.959	37.29	56.621	55.03		
Feb. 9.7	28.976	134	08.64	14.826	36.84	56.487	54.63		
19.7	28.842	126	08.21	14.690	36.48	56.350	54.37		
Mar. 1.7	28.716	110	07.86	14.560	36.22	56.218	54.27		
11.6	28.606	87	07.62	14.445	36.09	56.101	54.33		
21.6	28.519	55	07.50	14.353	36.11	56.005	54.58		
31.6	28.464	16	07.54	14.292	36.30	55.939	55.03		
Apr. 10.6	28.448	26	07.77	14.268	36.67	55.910	55.70		
20.5	28.474	71	08.19	14.286	37.26	55.922	56.58		
30.5	28.545	118	08.83	14.348	38.06	55.978	57.68		
May 10.5	28.663	162	09.69	14.457	39.07	56.079	58.99		
20.4	28.825	204	10.77	14.609	40.30	56.226	60.50		
30.4	29.029	240	12.05	14.804	41.71	56.414	62.17		
June 9.4	29.269	271	13.51	15.036	43.28	56.639	63.98		
19.4	29.540	294	15.12	15.299	44.98	56.897	65.89		
29.3	29.834	311	16.84	15.587	46.77	57.180	67.86		
July 9.3	30.145	320	18.63	15.893	48.61	57.481	69.82		
19.3	30.465	322	20.44	16.209	50.43	57.793	71.73		
29.3	30.787	316	22.22	16.528	52.21	58.109	73.53		
Aug. 8.2	31.103	304	23.91	16.842	53.87	58.422	75.18		
18.2	31.407	287	25.49	17.146	55.39	58.725	76.63		
28.2	31.694	265	26.91	17.434	56.73	59.012	77.85		
Sept. 7.1	31.959	241	28.14	17.702	57.85	59.280	78.80		
17.1	32.200	213	29.16	17.946	58.74	59.524	79.48		
27.1	32.413	184	29.96	18.164	59.39	59.743	79.88		
Oct. 7.1	32.597	155	30.54	18.354	59.80	59.933	80.00		
17.0	32.752	125	30.90	18.514	59.98	60.094	79.88		
27.0	32.877	95	31.06	18.646	59.96	60.226	79.53		
Nov. 5.9	32.972	66	31.04	18.747	59.75	60.328	78.99		
15.9	33.038	36	30.88	18.818	59.39	60.401	78.32		
25.9	33.074	6	30.60	18.861	58.93	60.443	77.54		
Dec. 5.9	33.081	21	30.22	18.873	58.38	60.456	76.71		
15.9	33.060	49	29.77	18.857	57.79	60.440	75.86		
25.8	33.011	74	29.27	18.812	57.16	60.395	75.03		
35.8	32.937		28.75	18.741	56.55	60.324	74.25		
Mean Place	29.196	06.36	14.978	35.32	56.577	54.79			
Sec δ, Tan δ	1.010	+0.143	1.004	+0.093	1.000	0.000			
a, a'	+3.2	+16.2	+3.1	+15.8	+3.1	+15.6			
b, b'	+0.01	-0.6	0.00	-0.6	0.00	-0.6			
Authority and Catalogue No.	B.J.	143	N.A.	150	B.J.	154			

APPARENT PLACES OF STARS, 1931.

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AT UPPER TRANSIT AT GREENWICH.

Name Mag. Spect.	γ^2 Ceti		π Ceti		β Fornacis	
	3.69	Az	4.39	B ₅	4.50	Ko
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 02 ^m 39	[°] +2 ['] 56	^h 02 ^m 40	[°] -14 ['] 08	^h 02 ^m 46	[°] -32 ['] 41
Jan. 0.8	43.708 ^s	48.86 ^s	50.771 ^s	62.20 ^s	12.975 ^s	48.00 ^s
10.8	43.623 ⁸⁵	48.20 ⁶⁶	50.674 ⁹⁷	63.23 ¹⁰³	12.837 ¹³⁸	49.30 ¹³⁰
20.8	43.516 ¹⁰⁷	47.60 ⁶⁰	50.554 ¹²⁰	64.02 ⁷⁹	12.675 ¹⁶²	50.20 ⁹⁰
30.8	43.393 ¹²³	47.08 ⁵²	50.419 ¹³⁵	64.55 ⁵³	12.497 ¹⁷⁸	50.69 ⁴⁹
Feb. 9.7	43.259 ¹³⁴	46.65 ⁴³	50.273 ¹⁴⁶	64.82 ²⁷	12.308 ¹⁸⁹	50.74 ⁵
	43.121 ¹³⁸	46.33 ³²	50.124 ¹⁴⁹	64.81 ^I	12.117 ¹⁹¹	50.36 ³⁸
Mar. 19.7	42.988 ¹³³	46.13 ²⁰	49.981 ¹⁴³	64.51 ³⁰	11.932 ¹⁸⁵	49.55 ⁸¹
1.7	42.868 ¹²⁰	46.08 ⁵	49.850 ¹³¹	63.93 ⁵⁸	11.763 ¹⁶⁹	48.34 ¹²¹
11.6	42.770 ⁹⁸	46.20 ¹²	49.742 ¹⁰⁸	63.06 ⁸⁷	11.617 ¹⁴⁶	46.75 ¹⁵⁹
21.6	42.702 ⁶⁸	46.50 ³⁰	49.663 ⁷⁹	61.92 ¹¹⁴	11.504 ¹¹³	44.81 ¹⁹⁴
31.6	42.670 ³²	46.99 ⁴⁹	49.620 ⁴³	60.51 ¹⁴¹	11.429 ⁷⁵	42.54 ²²⁷
Apr. 10.6	42.679 ⁹	47.70 ⁷¹	49.618 ²	58.85 ¹⁶⁶	11.400 ²⁹	40.01 ²⁵³
20.5	42.733 ⁵⁴	48.62 ⁹²	49.661 ⁴³	56.97 ¹⁸⁸	11.419 ¹⁹	37.25 ²⁷⁶
30.5	42.833 ¹⁰⁰	49.75 ¹¹³	49.749 ⁸⁸	54.88 ²⁰⁹	11.489 ⁷⁰	34.32 ²⁹³
May 10.5	42.977 ¹⁴⁴	51.09 ¹³⁴	49.883 ¹³⁴	52.64 ²²⁴	11.609 ¹²⁰	31.27 ³⁰⁵
20.5	43.163 ¹⁸⁶	52.60 ¹⁵¹	50.060 ¹⁷⁷	50.28 ²³⁶	11.778 ¹⁶⁹	28.18 ³⁰⁹
June 30.4	43.388 ²²⁵	54.26 ¹⁶⁶	50.276 ²¹⁶	47.86 ²⁴²	11.991 ²¹³	25.11 ³⁰⁷
9.4	43.645 ²⁵⁷	56.04 ¹⁷⁸	50.525 ²⁴⁹	45.43 ²⁴³	12.245 ²⁵⁴	22.14 ²⁹⁷
19.4	43.927 ²⁸²	57.89 ¹⁸⁵	50.802 ²⁷⁷	43.05 ²³⁸	12.532 ²⁸⁷	19.33 ²⁸¹
29.3	44.228 ³⁰¹	59.76 ¹⁸⁷	51.100 ²⁹⁸	40.78 ²²⁷	12.844 ³¹²	16.78 ²⁵⁵
July 9.3	44.540 ³¹²	61.60 ¹⁸⁴	51.411 ³¹¹	38.69 ²⁰⁹	13.175 ³³¹	14.53 ²²⁵
19.3	44.857 ³¹⁷	63.37 ¹⁷⁷	51.728 ³¹⁷	36.82 ¹⁸⁷	13.515 ³⁴⁰	12.65 ¹⁸⁸
29.3	45.170 ³¹³	65.01 ¹⁶⁴	52.043 ³¹⁵	35.24 ¹⁵⁸	13.858 ³⁴³	11.20 ¹⁴⁵
Aug. 8.2	45.474 ³⁰⁴	66.49 ¹⁴⁸	52.350 ³⁰⁷	33.99 ¹²⁵	14.193 ³³⁵	10.22 ⁹⁸
18.2	45.764 ²⁹⁰	67.76 ¹²⁷	52.642 ²⁹²	33.09 ⁹⁰	14.515 ³²²	09.73 ⁴⁹
28.2	46.034 ²⁷⁰	68.79 ¹⁰³	52.915 ²⁷³	32.57 ⁵²	14.816 ³⁰¹	09.75 ²
Sept. 7.2	46.282 ²⁴⁸	69.57 ⁷⁸	53.164 ²⁴⁹	32.44 ¹³	15.091 ²⁷⁵	10.26 ⁵¹
17.1	46.504 ²²²	70.09 ⁵²	53.386 ²²²	32.69 ²⁵	15.335 ²⁴⁴	11.25 ⁹⁹
27.1	46.699 ¹⁹⁵	70.36 ²⁷	53.579 ¹⁹³	33.28 ⁵⁹	15.545 ²¹⁰	12.67 ¹⁴²
Oct. 7.1	46.865 ¹⁶⁶	70.39 ³	53.741 ¹⁶²	34.19 ⁹¹	15.718 ¹⁷³	14.45 ¹⁷⁸
17.0	47.002 ¹³⁷	70.21 ¹⁸	53.872 ¹³¹	35.35 ¹¹⁶	15.853 ¹³⁵	16.52 ²⁰⁷
Nov. 27.0	47.110 ¹⁰⁸	69.84 ³⁷	53.971 ⁹⁹	36.72 ¹³⁷	15.948 ⁹⁵	18.79 ²²⁷
5.9	47.187 ⁷⁷	69.32 ⁵²	54.038 ⁶⁷	38.21 ¹⁴⁹	16.004 ⁵⁶	21.17 ²³⁸
15.9	47.234 ⁴⁷	68.70 ⁶²	54.074 ³⁶	39.76 ¹⁵⁵	16.021 ¹⁷	23.56 ²³⁹
25.9	47.252 ¹⁸	68.01 ⁶⁹	54.078 ⁴	41.31 ¹⁵⁵	16.000 ²¹	25.85 ²²⁹
Dec. 5.9	47.240 ¹²	67.29 ⁷²	54.052 ²⁶	42.78 ¹⁴⁷	15.943 ⁵⁷	27.97 ²¹²
15.9	47.200 ⁴⁰	66.57 ⁷²	53.997 ⁵⁵	44.13 ¹³⁵	15.853 ⁹⁰	29.83 ¹⁸⁶
25.9	47.131 ⁶⁹	65.86 ⁷¹	53.914 ⁸³	45.29 ¹¹⁶	15.730 ¹²³	31.37 ¹⁵⁴
Mean Place Sec δ , Tan δ	43.351 1.001	45.73 +0.051	50.235 1.031	60.25 -0.252	12.103 1.188	41.38 -0.642
a, a'	+3.1	+15.4	+2.9	+15.3	+2.5	+15.0
b, b'	0.00	-0.6	-0.01	-0.6	-0.03	-0.7
Authority and Catalogue No.	A.N.	163	B.J.	164	B.J.	169

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name Mag. Spect.	σ Arietis		ϵ Arietis <i>m.</i>		θ^1 Eridani	
	5.46	B5	4.64	A2	3.42	A2
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 02 ^m 47	[°] +14 ['] 47	^h 02 ^m 55	[°] +21 ['] 03	^h 02 ^m 55	[°] -40 ['] 34
Jan. 0.8	41.020 ^s	62.69 ^s	15.974 ^s	64.60 ^s	39.792 ^s	56.90 ^s
10.8	40.939 ^s	62.38 ^s	15.892 ^s	64.50 ^s	39.626 ^s	58.35 ^s
20.8	40.832 ^s	62.00 ^s	15.783 ^s	64.28 ^s	39.433 ^s	59.35 ^s
30.8	40.706 ^s	61.57 ^s	15.652 ^s	63.95 ^s	39.221 ^s	59.87 ^s
Feb. 9.7	40.567 ^s	61.10 ^s	15.507 ^s	63.52 ^s	38.997 ^s	59.90 ^s
19.7	40.423 ^s	60.62 ^s	15.353 ^s	63.00 ^s	38.769 ^s	59.45 ^s
Mar. 1.7	40.283 ^s	60.14 ^s	15.203 ^s	62.42 ^s	38.547 ^s	58.53 ^s
11.7	40.155 ^s	59.70 ^s	15.066 ^s	61.81 ^s	38.341 ^s	57.16 ^s
21.6	40.050 ^s	59.32 ^s	14.951 ^s	61.20 ^s	38.160 ^s	55.37 ^s
31.6	39.975 ^s	59.04 ^s	14.867 ^s	60.64 ^s	38.013 ^s	53.20 ^s
Apr. 10.6	39.937 ^s	58.89 ^s	14.822 ^s	60.17 ^s	37.908 ^s	50.69 ^s
20.5	39.943 ^s	58.91 ^s	14.821 ^s	59.84 ^s	37.850 ^s	47.90 ^s
30.5	39.995 ^s	59.11 ^s	14.867 ^s	59.66 ^s	37.845 ^s	44.87 ^s
May 10.5	40.095 ^s	59.53 ^s	14.963 ^s	59.68 ^s	37.894 ^s	41.68 ^s
20.5	40.241 ^s	60.15 ^s	15.108 ^s	59.91 ^s	37.998 ^s	38.38 ^s
30.4	40.431 ^s	60.99 ^s	15.298 ^s	60.37 ^s	38.156 ^s	35.06 ^s
June 9.4	40.660 ^s	62.04 ^s	15.530 ^s	61.05 ^s	38.364 ^s	31.79 ^s
19.4	40.924 ^s	63.26 ^s	15.797 ^s	61.93 ^s	38.617 ^s	28.64 ^s
29.4	41.214 ^s	64.64 ^s	16.093 ^s	63.02 ^s	38.908 ^s	25.69 ^s
July 9.3	41.524 ^s	66.14 ^s	16.410 ^s	64.26 ^s	39.230 ^s	23.02 ^s
19.3	41.847 ^s	67.71 ^s	16.741 ^s	65.64 ^s	39.575 ^s	20.71 ^s
29.3	42.174 ^s	69.33 ^s	17.077 ^s	67.11 ^s	39.934 ^s	18.81 ^s
Aug. 8.2	42.499 ^s	70.93 ^s	17.413 ^s	68.64 ^s	40.298 ^s	17.38 ^s
18.2	42.816 ^s	72.49 ^s	17.742 ^s	70.18 ^s	40.658 ^s	16.46 ^s
28.2	43.119 ^s	73.95 ^s	18.057 ^s	71.69 ^s	41.006 ^s	16.08 ^s
Sept. 7.2	43.403 ^s	75.29 ^s	18.355 ^s	73.13 ^s	41.334 ^s	16.25 ^s
17.1	43.666 ^s	76.49 ^s	18.632 ^s	74.49 ^s	41.635 ^s	16.96 ^s
27.1	43.904 ^s	77.51 ^s	18.884 ^s	75.74 ^s	41.903 ^s	18.18 ^s
Oct. 7.1	44.115 ^s	78.36 ^s	19.109 ^s	76.86 ^s	42.135 ^s	19.87 ^s
17.1	44.298 ^s	79.03 ^s	19.306 ^s	77.85 ^s	42.326 ^s	21.94 ^s
27.0	44.451 ^s	79.53 ^s	19.474 ^s	78.69 ^s	42.473 ^s	24.32 ^s
Nov. 5.9	44.575 ^s	79.88 ^s	19.611 ^s	79.40 ^s	42.575 ^s	26.92 ^s
15.9	44.668 ^s	80.08 ^s	19.716 ^s	79.97 ^s	42.632 ^s	29.62 ^s
25.9	44.731 ^s	80.15 ^s	19.790 ^s	80.42 ^s	42.644 ^s	32.31 ^s
Dec. 5.9	44.761 ^s	80.11 ^s	19.829 ^s	80.74 ^s	42.613 ^s	34.90 ^s
15.9	44.760 ^s	79.97 ^s	19.834 ^s	80.94 ^s	42.540 ^s	37.28 ^s
25.9	44.726 ^s	79.75 ^s	19.806 ^s	81.02 ^s	42.427 ^s	39.36 ^s
35.8	44.663 ^s	79.46 ^s	19.744 ^s	80.98 ^s	42.280 ^s	41.08 ^s
Mean Place	40.703	55.79	15.645	55.76	38.667	49.11
Sec δ , Tan δ	1.034	+0.264	1.072	+0.385	1.317	-0.857
α , α'	+3.3	+14.9	+3.4	+14.5	+2.3	+14.4
b , b'	+0.01	-0.7	+0.02	-0.7	-0.04	-0.7
Authority and Catalogue No.	N.A.	170	N.A.	175	B.J.	176

† Second transit, Nov. 5.

APPARENT PLACES OF STARS, 1931.

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AT UPPER TRANSIT AT GREENWICH.

Name Mag. Spect.	α Ceti		γ Persei		ρ Persei	
	2.82	Ma	3.08	F5-A3	Var.	Mb
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 02 ^m 58	[°] +3 ['] 49	^h 02 ^m 59	[°] +53 ['] 14	^h 03 ^m 00	[°] +38 ['] 34
Jan. 0.8	40°618 ^s	16°45 ["]	47°442 ^s	32°31 ["]	45°109 ^s	40°55 ["]
10.8	40°543 ^s	15°80 ["]	47°276 ^s	33°41 ["]	45°004 ^s	41°11 ["]
20.8	40°442 ^s	15°20 ["]	47°066 ^s	34°13 ["]	44°865 ^s	41°39 ["]
30.8	40°321 ^s	14°68 ["]	46°822 ^s	34°42 ["]	44°698 ^s	41°39 ["]
Feb. 9.7	40°185 ^s	14°25 ["]	46°555 ^s	34°28 ["]	44°512 ^s	41°10 ["]
19.7	40°042 ^s	13°92 ["]	46°281 ^s	33°72 ["]	44°319 ^s	40°53 ["]
Mar. 1.7	39°901 ^s	13°70 ["]	46°013 ^s	32°78 ["]	44°128 ^s	39°71 ["]
11.7	39°771 ^s	13°62 ["]	45°767 ^s	31°49 ["]	43°952 ^s	38°69 ["]
21.6	39°660 ^s	13°69 ["]	45°558 ^s	29°92 ["]	43°804 ^s	37°51 ["]
31.6	39°577 ^s	13°93 ["]	45°400 ^s	28°15 ["]	43°693 ^s	36°24 ["]
Apr. 10.6	39°529 ^s	14°36 ["]	45°302 ^s	26°25 ["]	43°627 ^s	34°93 ["]
20.5	39°521 ^s	14°99 ["]	45°272 ^s	24°31 ["]	43°615 ^s	33°66 ["]
30.5	39°557 ^s	15°83 ["]	45°315 ^s	22°41 ["]	43°660 ^s	32°49 ["]
May 10.5	39°639 ^s	16°86 ["]	45°433 ^s	20°64 ["]	43°763 ^s	31°48 ["]
20.5	39°767 ^s	18°10 ["]	45°624 ^s	19°06 ["]	43°923 ^s	30°67 ["]
30.4	39°937 ^s	19°51 ["]	45°884 ^s	17°73 ["]	44°137 ^s	30°10 ["]
June 9.4	40°147 ^s	21°08 ["]	46°205 ^s	16°71 ["]	44°400 ^s	29°81 ["]
19.4	40°392 ^s	22°76 ["]	46°579 ^s	16°02 ["]	44°705 ^s	29°80 ["]
29.4	40°664 ^s	24°54 ["]	46°996 ^s	15°69 ["]	45°043 ^s	30°07 ["]
July 9.3	40°957 ^s	26°34 ["]	47°446 ^s	15°73 ["]	45°408 ^s	30°64 ["]
19.3	41°265 ^s	28°13 ["]	47°919 ^s	16°13 ["]	45°789 ^s	31°47 ["]
29.3	41°580 ^s	29°85 ["]	48°403 ^s	16°88 ["]	46°179 ^s	32°55 ["]
Aug. 8.2	41°894 ^s	31°45 ["]	48°889 ^s	17°97 ["]	46°569 ^s	33°84 ["]
18.2	42°202 ^s	32°90 ["]	49°367 ^s	19°36 ["]	46°952 ^s	35°31 ["]
28.2	42°499 ^s	34°16 ["]	49°828 ^s	21°02 ["]	47°321 ^s	36°92 ["]
Sept. 7.2	42°779 ^s	35°18 ["]	50°266 ^s	22°93 ["]	47°671 ^s	38°65 ["]
17.1	43°039 ^s	35°96 ["]	50°676 ^s	25°03 ["]	47°997 ^s	40°44 ["]
27.1	43°275 ^s	36°49 ["]	51°051 ^s	27°30 ["]	48°297 ^s	42°28 ["]
Oct. 7.1	43°486 ^s	36°76 ["]	51°387 ^s	29°68 ["]	48°566 ^s	44°13 ["]
17.1	43°670 ^s	36°80 ["]	51°681 ^s	32°14 ["]	48°803 ^s	45°96 ["]
27.0	43°826 ^s	36°62 ["]	51°929 ^s	34°64 ["]	49°006 ^s	47°74 ["]
Nov. 6.0	43°953 ^s	36°26 ["]	52°129 ^s	37°13 ["]	49°173 ^s	49°45 ["]
15.9	44°051 ^s	35°75 ["]	52°275 ^s	39°55 ["]	49°301 ^s	51°07 ["]
25.9	44°118 ^s	35°14 ["]	52°367 ^s	41°86 ["]	49°389 ^s	52°57 ["]
Dec. 5.9	44°153 ^s	34°45 ["]	52°403 ^s	44°00 ["]	49°435 ^s	53°91 ["]
15.9	44°157 ^s	33°73 ["]	52°381 ^s	45°92 ["]	49°438 ^s	55°07 ["]
25.9	44°130 ^s	33°02 ["]	52°303 ^s	47°57 ["]	49°399 ^s	56°02 ["]
35.8	44°073 ^s	32°32 ["]	52°170 ^s	48°88 ["]	49°320 ^s	56°72 ["]
Mean Place Sec 8, Tan 8	40°173 1°002	12°51 +0°067	47°064 1°671	15°71 +1°339	44°780 1°279	27°11 +0°798
α, α' δ, δ'	+3°1 0°00	+14°3 -0°7	+4°3 +0°06	+14°2 -0°7	+3°8 +0°04	+14°1 -0°7
Authority and Catalogue No.	B.J.	179	B.J.	181	B.J.	182

† First transit, Nov. 6.

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name	μ Horologii		β Persei (<i>Algol</i>)		δ Arietis	
	5.16	Fo	Var.	B8	4.53	Ko
Mag. Spect.						
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 03 ^m 01	[°] —59 ['] 59	^h 03 ^m 03	[°] +40 ['] 41	^h 03 ^m 07	[°] +19 ['] 28
Jan. 0.9	61.24 ^s 33	87.64 ^s 151	40.568 ^s 108	42.09 ^s 67	41.109 ^s 73	09.57 ^s 12
10.8	60.91 36	89.15 97	40.460 145	42.76 37	41.036 102	09.45 22
20.8	60.55 38	90.12 39	40.315 174	43.13 6	40.934 126	09.23 30
30.8	60.17 40	90.51 18	40.141 194	43.19 24	40.808 143	08.93 39
Feb. 9.7	59.77 41	90.33 75	39.947 202	42.95 54	40.665 153	08.54 46
19.7	59.36 39	89.58 129	39.745 200	42.41 81	40.512 151	08.08 50
Mar. 1.7	58.97 36	88.29 179	39.545 184	41.60 105	40.361 142	07.58 52
11.7	58.61 33	86.50 225	39.361 158	40.55 122	40.219 122	07.06 51
21.6	58.28 27	84.25 266	39.203 119	39.33 133	40.097 93	06.55 47
31.6	58.01 22	81.59 302	39.084 72	38.00 139	40.004 55	06.08 38
Apr. 10.6	57.79 15	78.57 329	39.012 17	36.61 136	39.949 13	05.70 25
20.6	57.64 8	75.28 350	38.995 40	35.25 128	39.936 34	05.45 9
30.5	57.56 —	71.78 364	39.035 101	33.97 114	39.970 83	05.36 8
May 10.5	57.56 7	68.14 370	39.136 160	32.83 93	40.053 132	05.44 29
20.5	57.63 16	64.44 366	39.296 216	31.90 69	40.185 177	05.73 50
30.4	57.79 23	60.78 356	39.512 266	31.21 42	40.362 220	06.23 71
June 9.4	58.02 29	57.22 336	39.778 309	30.79 13	40.582 256	06.94 90
19.4	58.31 36	53.86 308	40.087 345	30.66 16	40.838 286	07.84 108
29.4	58.67 41	50.78 273	40.432 372	30.82 47	41.124 309	08.92 123
July 9.3	59.08 45	48.05 229	40.804 390	31.29 74	41.433 325	10.15 135
19.3	59.53 48	45.76 179	41.194 398	32.03 100	41.758 332	11.50 143
29.3	60.01 49	43.97 125	41.592 400	33.03 123	42.090 333	12.93 146
Aug. 8.3	60.50 49	42.72 65	41.992 393	34.26 143	42.423 328	14.39 146
18.2	60.99 48	42.07 5	42.385 380	35.69 160	42.751 317	15.85 142
28.2	61.47 46	42.02 56	42.765 361	37.29 172	43.068 301	17.27 134
Sept. 7.2	61.93 42	42.58 116	43.126 338	39.01 182	43.369 282	18.61 125
17.1	62.35 37	43.74 171	43.464 310	40.83 189	43.651 259	19.86 112
27.1	62.72 32	45.45 218	43.774 279	42.72 191	43.910 234	20.98 99
Oct. 7.1	63.04 25	47.63 261	44.053 247	44.63 191	44.144 208	21.97 84
17.1	63.29 18	50.24 292	44.300 211	46.54 188	44.352 179	22.81 70
27.0	63.47 11	53.16 311	44.511 174	48.42 182	44.531 149	23.51 57
Nov. 6.0	63.58 3	56.27 318	44.685 134	50.24 173	44.680 118	24.08 44
15.9	63.61 4	59.45 313	44.819 93	51.97 162	44.798 86	24.52 32
25.9	63.57 12	62.58 296	44.912 49	53.59 147	44.884 52	24.84 22
Dec. 5.9	63.45 18	65.54 268	44.961 5	55.06 128	44.936 18	25.06 11
15.9	63.27 24	68.22 230	44.966 40	56.34 107	44.954 18	25.17 1
25.9	63.03 30	70.52 183	44.926 82	57.41 81	44.936 52	25.18 8
35.8	62.73	72.35	44.844	58.22	44.884	25.10
Mean Place	59.100	77.09	40.216	28.17	40.706	01.03
Sec δ , Tan δ	2.000	—1.732	1.319	+0.860	1.061	+0.353
a, a'	+1.4	+14.1	+3.9	+13.9	+3.4	+13.7
b, b'	—0.08	—0.7	+0.04	—0.7	+0.02	—0.7
Authority and Catalogue No.	B.J.	183	B.J.	185	B.J.	187

APPARENT PLACES OF STARS, 1931.

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AT UPPER TRANSIT AT GREENWICH.

Name Mag. Spect.	τ^1 Arietis		α Persei		σ Tauri	
	5.17	B ₃	1.90	F ₅	3.80	G ₅
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 03 ^m 17	[°] +20 ['] 53	^h 03 ^m 19	[°] +49 ['] 37	^h 03 ^m 21	[°] +8 ['] 47
Jan. 0.9	14.749 ^s	67.40	23.635 ^s	17.47	06.304 ^s	20.08
10.8	14.682 ⁶⁷	67.35	23.508 ¹²⁷	18.58	06.242 ⁶²	19.58
20.8	14.582 ¹⁰⁰	67.20	23.336 ¹⁷²	19.35	06.150 ⁹²	19.09
30.8	14.457 ¹²⁵	66.94	23.127 ²⁰⁹	19.76	06.033 ¹¹⁷	18.63
Feb. 9.8	14.312 ¹⁴⁵	66.60	22.891 ²³⁶	19.78	05.897 ¹³⁶	18.22
	155	42	250	37	147	36
19.7	14.157	66.18	22.641	19.41	05.750	17.86
Mar. 1.7	14.000 ¹⁵⁷	65.69	22.391 ²⁵⁰	18.68	05.601 ¹⁴⁹	17.56
11.7	13.852 ¹⁴⁸	65.16	22.156 ²³⁵	17.63	05.459 ¹⁴²	17.34
21.6	13.722 ¹³⁰	64.63	21.950 ²⁰⁶	16.30	05.334 ¹²⁵	17.23
31.6	13.621 ¹⁰¹	64.13	21.787 ¹⁶³	14.76	05.234 ¹⁰⁰	17.24
	64	44	110	107	66	16
Apr. 10.6	13.557 ²²	63.69	21.677 ⁴⁹	13.09	05.168 ²⁶	17.40
20.6	13.535 ²⁵	63.37	21.628 ¹⁷	11.36	05.142 ¹⁷	17.73
30.5	13.560 ⁷⁴	63.18	21.645 ⁸⁷	09.64	05.159 ⁶⁴	18.23
May 10.5	13.634 ¹²³	63.17	21.732 ¹⁵⁶	08.02	05.223 ¹¹⁰	18.92
20.5	13.757 ¹⁷¹	63.35	21.888 ²²¹	06.56	05.333 ¹⁵⁴	19.81
	212	59	280	98	196	107
June 9.4	14.140 ²⁵¹	64.31	22.389 ³³³	05.32	05.487 ¹⁹⁶	20.88
19.4	14.391 ²⁸²	65.09	22.722 ³⁷⁷	04.34	05.683 ²³²	22.12
29.4	14.673 ³⁰⁷	66.05	23.099 ⁴¹¹	03.65	05.915 ²⁶²	23.49
July 9.3	14.980 ³²³	67.17	23.510 ⁴³⁶	03.28	06.177 ²⁸⁷	24.99
		124		4	304	156
19.3	15.303 ³³³	68.41	23.946 ⁴⁵¹	03.24	06.464 ³⁰⁴	26.55
29.3	15.636 ³³⁶	69.74	24.397 ⁴⁵⁶	03.52	06.768 ³¹⁴	28.13
Aug. 8.3	15.972 ³³¹	71.13	24.853 ⁴⁵²	04.12	07.082 ³¹⁷	29.70
18.2	16.303 ³²²	72.52	25.305 ⁴⁴²	05.03	07.399 ³¹⁷	31.20
28.2	16.625 ³⁰⁹	73.89	25.747 ⁴²⁴	06.21	07.713 ³¹⁴	32.60
		132		143	306	125
Sept. 7.2	16.934 ²⁸⁹	75.21	26.171 ⁴⁰²	07.64	08.019 ²⁹²	33.85
17.2	17.223 ²⁶⁹	76.44	26.573 ³⁷²	09.28	08.311 ²⁷⁵	34.93
27.1	17.492 ²⁴⁴	77.56	26.945 ³⁴⁰	11.10	08.586 ²⁵⁵	35.81
Oct. 7.1	17.736 ²¹⁸	78.56	27.285 ³⁰³	13.08	08.841 ²³²	36.47
17.1	17.954 ¹⁹¹	79.44	27.588 ²⁶³	15.17	09.073 ²⁰⁸	36.92
		74		216	181	24
27.0	18.145 ¹⁶¹	80.18	27.851 ²²⁰	17.33	09.281 ¹⁸¹	37.16
Nov. 6.0	18.306 ¹²⁹	80.80	28.071 ¹⁷³	19.54	09.462 ¹⁵³	37.20
15.9	18.435 ⁹⁷	81.31	28.244 ¹²²	21.75	09.615 ¹²³	37.08
25.9	18.532 ⁶²	81.70	28.366 ⁷⁰	23.93	09.738 ⁹²	36.81
Dec. 5.9	18.594 ²⁶	81.99	28.436 ¹⁵	26.03	09.830 ⁶⁰	36.44
		19		28.00	26	35.99
15.9	18.620 ¹⁰	82.18	28.451 ⁴⁰	29.79	09.916 ⁸	35.49
25.9	18.610 ⁴⁶	82.26	28.411 ⁹³	31.36	09.908 ⁴²	34.97
35.9	18.564	82.26	28.318	32.65	09.866	34.44
Mean Place	14.299	58.36	23.111	01.81	05.784	14.21
Sec δ , Tan δ	1.070	+0.382	1.543	+1.176	1.012	+0.155
a, a'	+3.5	+13.1	+4.3	+12.9	+3.2	+12.8
b, b'	+0.02	-0.8	+0.05	-0.8	+0.01	-0.8
Authority and Catalogue No.	N.A.	197	B.J.	200	B.J.	201

AT UPPER TRANSIT AT GREENWICH.

Name	f Tauri		ε Eridani		45 G Horologii	
Mag. Spect.	4.28	Ko	3.81	Ko	5.60	Ko
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 03 ^m 27	[°] +12 ['] 42	^h 03 ^m 29	[°] −9 ['] 40	^h 03 ^m 30	[°] −50 ['] 36
Jan. 0.9	^s 04.103	^s 12.49	^s 41.350	^s 85.36	^s 32.840	^s 50.25
10.8	04.044 59	12.14 35	41.277 73	86.49 113	32.634 206	52.12 187
20.8	03.954 90	11.77 37	41.175 102	87.42 93	32.389 245	53.51 139
30.8	03.838 116	11.39 38	41.048 127	88.13 71	32.113 276	54.38 87
Feb. 9.8	03.702 136	11.01 38	40.902 146	88.62 49	31.817 296	54.72 34
	149	37	157	23	307	20
19.7	03.553	10.64 34	40.745 159	88.85 3	31.510 307	54.52 74
Mar. 1.7	03.401 146	10.30 30	40.586 153	88.82 28	31.203 294	53.78 124
11.7	03.255 130	10.00 24	40.433 137	88.54 55	30.909 270	52.54 172
21.7	03.125 104	09.76 15	40.296 113	87.99 80	30.639 237	50.82 215
31.6	03.021 71	09.61 3	40.183 81	87.19 105	30.402 193	48.67 255
Apr. 10.6	02.950 31	09.58 12	40.102 43	86.14 130	30.209 141	46.12 287
20.6	02.919 14	09.70 27	40.059 2	84.84 153	30.068 83	43.25 315
30.5	02.933 60	09.97 46	40.057 2	83.31 174	29.985 22	40.10 335
May 10.5	02.993 108	10.43 64	40.102 45	81.57 192	29.963 43	36.75 349
20.5	03.101 153	11.07 82	40.193 131	79.65 207	30.006 107	33.26 354
30.5	03.254 195	11.89 100	40.328 176	77.58 216	30.113 168	29.72 351
June 9.4	03.449 232	12.89 116	40.504 213	75.42 222	30.281 226	26.21 340
19.4	03.681 262	14.05 130	40.717 246	73.20 221	30.507 277	22.81 320
29.4	03.943 288	15.35 138	40.963 272	70.99 216	30.784 321	19.61 292
July 9.4	04.231 307	16.73 145	41.235 290	68.83 204	31.105 357	16.69 256
19.3	04.538 317	18.18 146	41.525 302	66.79 186	31.462 384	14.13 213
29.3	04.855 321	19.64 143	41.827 307	64.93 163	31.846 401	12.00 164
Aug. 8.3	05.176 319	21.07 137	42.134 307	63.30 136	32.247 407	10.36 109
18.2	05.495 311	22.44 126	42.441 299	61.94 103	32.654 404	09.27 51
28.2	05.806 299	23.70 113	42.740 287	60.91 69	33.058 391	08.76 9
Sept. 7.2	06.105 282	24.83 96	43.027 270	60.22 32	33.449 368	08.85 69
17.2	06.387 263	25.79 79	43.297 249	59.90 5	33.817 337	09.54 126
27.1	06.650 241	26.58 60	43.546 227	59.95 40	34.154 298	10.80 178
Oct. 7.1	06.891 216	27.18 41	43.773 201	60.35 71	34.452 253	12.58 225
17.1	07.107 191	27.59 25	43.974 174	61.06 100	34.705 204	14.83 261
27.1	07.298 163	27.84 9	44.148 145	62.06 122	34.909 150	17.44 289
Nov. 6.0	07.461 133	27.93 4	44.293 113	63.28 139	35.059 93	20.33 305
15.9	07.594 101	27.89 14	44.406 81	64.67 149	35.152 36	23.38 309
25.9	07.695 68	27.75 22	44.487 48	66.16 151	35.188 21	26.47 301
Dec. 5.9	07.763 33	27.53 29	44.535 15	67.67 148	35.167 78	29.48 283
15.9	07.796 2	27.24 33	44.550 20	69.15 140	35.089 132	32.31 253
25.9	07.794 37	26.91 36	44.530 53	70.55 126	34.957 180	34.84 216
35.9	07.757	26.55	44.477	71.81	34.777	37.00
Mean Place	03.574	05.49	40.659	86.52	31.143	43.18
Sec δ, Tan δ	1.025	+0.225	1.014	−0.171	1.576	−1.218
a, a'	+3.3	+12.4	+2.9	+12.2	+1.8	+12.2
b, b'	+0.01	−0.8	−0.01	−0.8	−0.05	−0.8
Authority and Catalogue No.	B.J. 207		A.E. 210		A.N. 211	

No. 210. Corrected for a parallax of 0".30.

APPARENT PLACES OF STARS, 1931.

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AT UPPER TRANSIT AT GREENWICH.

Name	τ^3 Eridani		II Tauri		δ Persei	
	4.32	B8	6.15	Ao	3.10	B5
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	$^h \quad ^m$ 03 30	$^{\circ} \quad '$ -21 51	$^h \quad ^m$ 03 36	$^{\circ} \quad '$ +25 06	$^h \quad ^m$ 03 37	$^{\circ} \quad '$ +47 34
Jan. 0.9	45.164 ^s 88	49.31 ["] 149	39.249 ^s 58	37.95 ["] 17	60.788 ^s 98	21.76 ["] 115
10.8	45.076 119	50.80 118	39.191 94	38.12 5	60.690 147	22.91 85
20.8	44.957 144	51.98 86	39.097 123	38.17 8	60.543 188	23.76 52
30.8	44.813 163	52.84 52	38.974 148	38.09 22	60.355 218	24.28 16
Feb. 9.8	44.650 175	53.36 15	38.826 162	37.87 33	60.137 237	24.44 19
19.7	44.475 177	53.51 20	38.664 168	37.54 44	59.900 242	24.25 54
Mar. 1.7	44.298 171	53.31 56	38.496 161	37.10 54	59.658 232	23.71 86
11.7	44.127 155	52.75 92	38.335 146	36.56 59	59.426 209	22.85 113
21.7	43.972 130	51.83 124	38.189 119	35.97 61	59.217 173	21.72 135
31.6	43.842 98	50.59 156	38.070 83	35.36 59	59.044 125	20.37 150
Apr. 10.6	43.744 60	49.03 185	37.987 41	34.77 53	58.919 67	18.87 158
20.6	43.684 16	47.18 211	37.946 6	34.24 43	58.852 5	17.29 159
30.5	43.668 31	45.07 233	37.952 58	33.81 29	58.847 61	15.70 153
May 10.5	43.609 78	42.74 250	38.010 107	33.52 13	58.908 127	14.17 140
20.5	43.777 125	40.24 263	38.117 157	33.39 7	59.035 192	12.77 122
30.5	43.902 168	37.61 270	38.274 201	33.46 26	59.227 251	11.55 99
June 9.4	44.070 209	34.91 269	38.475 243	33.72 45	59.478 304	10.56 73
19.4	44.279 243	32.22 263	38.718 276	34.17 66	59.782 349	09.83 45
29.4	44.522 271	29.59 250	38.994 304	34.83 81	60.131 385	09.38 15
July 9.4	44.793 294	27.09 230	39.298 324	35.64 97	60.516 413	09.23 15
19.3	45.087 308	24.79 203	39.622 337	36.61 110	60.929 430	09.38 44
29.3	45.395 315	22.76 171	39.959 343	37.71 118	61.359 440	09.82 72
Aug. 8.3	45.710 316	21.05 134	40.302 342	38.89 123	61.799 440	10.54 98
18.2	46.026 311	19.71 91	40.644 337	40.12 125	62.239 433	11.52 120
28.2	46.337 299	18.80 47	40.981 324	41.37 124	62.672 422	12.72 141
Sept. 7.2	46.636 283	18.33 1	41.305 309	42.61 121	63.094 401	14.13 159
17.2	46.919 261	18.32 43	41.614 291	43.82 114	63.495 378	15.72 173
27.1	47.180 236	18.75 86	41.905 267	44.96 106	63.873 349	17.45 184
Oct. 7.1	47.416 209	19.61 124	42.172 243	46.02 98	64.222 317	19.29 193
17.1	47.625 179	20.85 158	42.415 217	47.00 89	64.539 281	21.22 198
27.1	47.804 146	22.43 183	42.632 187	47.89 79	64.820 241	23.20 200
Nov. 6.0	47.950 113	24.26 200	42.819 155	48.68 69	65.061 197	25.20 200
16.0	48.063 77	26.26 210	42.974 122	49.37 61	65.258 149	27.20 194
25.9	48.140 41	28.36 210	43.096 84	49.98 52	65.407 99	29.14 185
Dec. 5.9	48.181 4	30.46 203	43.180 47	50.50 42	65.506 44	30.99 172
15.9	48.185 33	32.49 188	43.227 6	50.92 33	65.550 10	32.71 153
25.9	48.152 68	34.37 166	43.233 33	51.25 22	65.540 65	34.24 129
35.9	48.084	36.03	43.200	51.47	65.475	35.53
Mean Place	44.293	47.75	38.702	27.77	60.133	06.81
Sec δ , Tan δ	1.077	-0.401	1.104	+0.469	1.482	+1.094
α, α'	+2.6	+12.1	+3.6	+11.7	+4.3	+11.6
b, b'	-0.02	-0.8	+0.02	-0.8	+0.04	-0.8
Authority and Catalogue No.	N.A.	212	N.A.	217	B.J.	218

§ Transit, Nov. 15.

† First transit, Nov. 16.

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name Mag. Spect.	δ Eridani		ι7 Tauri		η Tauri	
	3.72	Ko	3.81	B5p	2.96	B5p
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 03 ^m 39	[°] —9 ['] 59	^h 03 ^m 40	[°] +23 ['] 53	^h 03 ^m 43	[°] +23 ['] 53
Jan. 0.9	57.206 ^s	43.50 ["]	46.930 ^s	61.91 ["]	23.242 ^s	45.25 ["]
10.8	57.142 ^s	44.68 ["]	46.876 ^s	62.03 ["]	23.191 ^s	45.38 ["]
20.8	57.047 ^s	45.66 ["]	46.787 ^s	62.05 ["]	23.103 ^s	45.41 ["]
30.8	56.925 ^s	46.43 ["]	46.667 ^s	61.95 ["]	22.983 ^s	45.32 ["]
Feb. 9.8	56.782 ^s	46.96 ["]	46.522 ^s	61.74 ["]	22.839 ^s	45.12 ["]
19.7	56.626 ^s	47.23 ["]	46.362 ^s	61.42 ["]	22.679 ^s	44.82 ["]
Mar. 1.7	56.465 ^s	47.25 ["]	46.196 ^s	61.00 ["]	22.512 ^s	44.42 ["]
11.7	56.308 ^s	47.01 ["]	46.034 ^s	60.51 ["]	22.349 ^s	43.94 ["]
21.7	56.165 ^s	46.50 ["]	45.888 ^s	59.97 ["]	22.201 ^s	43.41 ["]
31.6	56.044 ^s	45.72 ["]	45.768 ^s	59.42 ["]	22.079 ^s	42.86 ["]
Apr. 10.6	55.953 ^s	44.69 ["]	45.682 ^s	58.89 ["]	21.991 ^s	42.33 ["]
20.6	55.900 ^s	43.41 ["]	45.638 ^s	58.42 ["]	21.944 ^s	41.87 ["]
30.5	55.888 ^s	41.90 ["]	45.640 ^s	58.06 ["]	21.944 ^s	41.51 ["]
May 10.5	55.921 ^s	40.17 ["]	45.692 ^s	57.83 ["]	21.994 ^s	41.28 ["]
20.5	55.999 ^s	38.26 ["]	45.795 ^s	57.77 ["]	22.094 ^s	41.21 ["]
30.5	56.123 ^s	36.19 ["]	45.946 ^s	57.89 ["]	22.243 ^s	41.31 ["]
June 9.4	56.288 ^s	34.01 ["]	46.143 ^s	58.20 ["]	22.437 ^s	41.61 ["]
19.4	56.492 ^s	31.78 ["]	46.380 ^s	58.70 ["]	22.672 ^s	42.10 ["]
29.4	56.728 ^s	29.54 ["]	46.651 ^s	59.38 ["]	22.940 ^s	42.76 ["]
July 9.4	56.993 ^s	27.35 ["]	46.950 ^s	60.23 ["]	23.238 ^s	43.59 ["]
19.3	57.277 ^s	25.27 ["]	47.270 ^s	61.21 ["]	23.557 ^s	44.56 ["]
29.3	57.576 ^s	23.37 ["]	47.603 ^s	62.31 ["]	23.889 ^s	45.64 ["]
Aug. 8.3	57.881 ^s	21.69 ["]	47.942 ^s	63.48 ["]	24.228 ^s	46.79 ["]
18.2	58.188 ^s	20.29 ["]	48.281 ^s	64.69 ["]	24.567 ^s	47.98 ["]
28.2	58.491 ^s	19.20 ["]	48.615 ^s	65.91 ["]	24.901 ^s	49.19 ["]
Sept. 7.2	58.783 ^s	18.47 ["]	48.938 ^s	67.11 ["]	25.225 ^s	50.37 ["]
17.2	59.061 ^s	18.10 ["]	49.247 ^s	68.25 ["]	25.534 ^s	51.50 ["]
27.1	59.321 ^s	18.10 ["]	49.537 ^s	69.33 ["]	25.826 ^s	52.55 ["]
Oct. 7.1	59.559 ^s	18.46 ["]	49.805 ^s	70.32 ["]	26.096 ^s	53.52 ["]
17.1	59.773 ^s	19.15 ["]	50.050 ^s	71.21 ["]	26.343 ^s	54.40 ["]
27.1	59.960 ^s	20.13 ["]	50.268 ^s	72.01 ["]	26.564 ^s	55.18 ["]
Nov. 6.0	60.119 ^s	21.35 ["]	50.458 ^s	72.71 ["]	26.756 ^s	55.87 ["]
16.0	60.248 ^s	22.74 ["]	50.617 ^s	73.32 ["]	26.918 ^s	56.47 ["]
25.9	60.344 ^s	24.24 ["]	50.741 ^s	73.84 ["]	27.046 ^s	56.98 ["]
Dec. 5.9	60.407 ^s	25.78 ["]	50.829 ^s	74.27 ["]	27.137 ^s	57.41 ["]
15.9	60.434 ^s	27.29 ["]	50.880 ^s	74.62 ["]	27.190 ^s	57.75 ["]
25.9	60.426 ^s	28.73 ["]	50.891 ^s	74.88 ["]	27.204 ^s	58.01 ["]
35.9	60.383 ^s	30.03 ["]	50.862 ^s	75.04 ["]	27.178 ^s	58.18 ["]
Mean Place	56.457	45.14	46.363	52.01	22.660	35.35
Sec δ, Tan δ	1.015	—0.176	1.094	+0.443	1.094	+0.443
α, α'	+2.9	+11.5	+3.6	+11.4	+3.6	+11.3
δ, δ'	—0.01	—0.8	+0.02	—0.8	+0.02	—0.8
Authority and Catalogue No.	A.N.	221	A.N.	224	B.J.	228

† First transit, Nov. 16.

AT UPPER TRANSIT AT GREENWICH.

Name	γ Hydri			ζ Persei			ϵ Persei		
Mag. Spect.	3.17		Ma	2.91		Br	2.96		Br
Mean Solar Date	R.A.	Dec.		R.A.	Dec.		R.A.	Dec.	
	^h 03 ^m 48	[°] —74 ['] 26		^h 03 ^m 49	[°] +31 ['] 40		^h 03 ^m 53	[°] +39 ['] 48	
Jan. 0.9	22.11	65	70.68	47.930	54	60.14	13.664	62	57.18
10.9	21.46	73	72.65	47.876	94	60.64	13.602	108	58.07
20.8	20.73	81	74.10	47.782	128	60.98	13.494	147	58.73
30.8	19.92	85	74.99	47.654	157	61.13	13.347	179	59.14
Feb. 9.8	19.07	87	75.30	47.497	175	61.10	13.168	199	59.29
19.7	18.20	86	75.02	47.322	183	60.88	12.969	208	59.16
Mar. 1.7	17.34	84	74.17	47.139	179	60.47	12.761	204	58.77
11.7	16.50	79	72.80	46.960	164	59.91	12.557	187	58.12
21.7	15.71	72	70.92	46.796	137	59.21	12.370	158	57.27
31.6	14.99	62	68.59	46.659	102	58.42	12.212	120	56.25
Apr. 10.6	14.37	52	65.86	46.557	57	57.59	12.092	70	55.12
20.6	13.85	40	62.80	46.500	7	56.76	12.022	16	53.93
30.6	13.45	27	59.47	46.493	45	55.98	12.006	42	52.74
May 10.5	13.18	13	55.96	46.538	99	55.30	12.048	101	51.61
20.5	13.05	1	52.32	46.637	151	54.76	12.149	159	50.60
30.5	13.06	15	48.65	46.788	200	54.39	12.308	212	49.75
June 9.4	13.21	28	45.03	46.988	244	54.21	12.520	261	49.09
19.4	13.49	41	41.54	47.232	281	54.24	12.781	303	48.66
29.4	13.90	53	38.27	47.513	312	54.49	13.084	337	48.45
July 9.4	14.43	63	35.33	47.825	336	54.93	13.421	363	48.50
19.3	15.06	71	32.76	48.161	351	55.55	13.784	382	48.78
29.3	15.77	77	30.66	48.512	360	56.35	14.166	391	49.29
Aug. 8.3	16.54	82	29.09	48.872	362	57.29	14.557	395	50.01
18.3	17.36	83	28.10	49.234	357	58.35	14.952	392	50.92
28.2	18.19	82	27.71	49.591	347	59.49	15.344	382	51.99
Sept. 7.2	19.01	79	27.96	49.938	334	60.68	15.726	367	53.19
17.2	19.80	72	28.84	50.272	315	61.90	16.093	348	54.50
27.1	20.52	64	30.31	50.587	295	63.13	16.441	325	55.89
Oct. 7.1	21.16	53	32.33	50.882	270	64.35	16.766	300	57.35
17.1	21.69	40	34.83	51.152	243	65.53	17.066	270	58.85
27.1	22.09	27	37.72	51.395	213	66.67	17.336	236	60.36
Nov. 6.0	22.36	12	40.88	51.608	179	67.77	17.572	200	61.87
16.0	22.48	3	44.20	51.787	144	68.81	17.772	158	63.37
25.9	22.45	18	47.55	51.931	104	69.78	17.930	115	64.82
Dec. 5.9	22.27	33	50.80	52.035	62	70.68	18.045	67	66.20
15.9	21.94	46	53.83	52.097	18	71.48	18.112	18	67.49
25.9	21.48	59	56.54	52.115	26	72.18	18.130	32	68.64
35.9	20.89		58.83	52.089		72.75	18.098		69.63
Mean Place	17.163	62.87		47.303	48.54		12.974	43.97	
Sec δ , Tan δ	3.731	—3.594		1.175	+0.617		1.302	+0.833	
a, δ'	—1.0	+10.9		+3.8	+10.8		+4.0	+10.5	
b, δ'	—0.13	—0.8		+0.02	—0.8		+0.03	—0.9	
Authority and Catalogue No.	B.J.	234		B.J.	235		B.J.	238	

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name	γ Eridani		λ Tauri		A Tauri	
Mag. Spect.	3.19	K5	Var.	B3	4.50	Ko
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 03 54	^m —13 41	^h 03 56	^m +12 17	^h 04 00	^m +21 53
Jan. 0.9	49.349 ^s 60	71.77 ^s 139	51.893 ^s 39	55.53 ^s 37	37.331 ^s 37	50.90 ^s 6
10.9	49.289 93	73.16 117	51.854 74	55.16 37	37.294 76	50.96 —
20.8	49.196 122	74.33 91	51.780 106	54.79 35	37.218 109	50.96 8
30.8	49.074 145	75.24 64	51.674 131	54.44 34	37.109 138	50.88 17
Feb. 9.8	48.929 162	75.88 35	51.543 149	54.10 32	36.971 156	50.71 24
19.8	48.767 169	76.23 6	51.394 157	53.78 28	36.815 166	50.47 32
Mar. 1.7	48.598 167	76.29 24	51.237 156	53.50 24	36.649 165	50.15 38
11.7	48.431 155	76.05 53	51.081 145	53.26 18	36.484 153	49.77 41
21.7	48.276 134	75.52 82	50.936 124	53.08 10	36.331 131	49.36 42
31.6	48.142 106	74.70 110	50.812 93	52.98 —	36.200 100	48.94 41
Apr. 10.6	48.036 71	73.60 137	50.719 56	52.98 12	36.100 60	48.53 34
20.6	47.965 29	72.23 162	50.663 14	53.10 27	36.040 16	48.19 25
30.6	47.936 16	70.61 184	50.649 32	53.37 42	36.024 33	47.94 13
May 10.5	47.952 61	68.77 204	50.681 79	53.79 59	36.057 81	47.81 1
20.5	48.013 106	66.73 219	50.760 125	54.38 76	36.138 130	47.82 18
30.5	48.119 150	64.54 229	50.885 168	55.14 91	36.268 176	48.00 34
June 9.5	48.269 189	62.25 235	51.053 208	56.05 105	36.444 217	48.34 51
19.4	48.458 225	59.90 235	51.261 241	57.10 118	36.661 252	48.85 67
29.4	48.683 254	57.55 228	51.502 270	58.28 126	36.913 283	49.52 81
July 9.4	48.937 277	55.27 215	51.772 291	59.54 132	37.196 305	50.33 92
19.3	49.214 293	53.12 196	52.063 306	60.86 133	37.501 322	51.25 102
29.3	49.507 303	51.16 171	52.369 316	62.19 130	37.823 330	52.27 107
Aug. 8.3	49.810 307	49.45 141	52.685 317	63.49 123	38.153 335	53.34 109
18.3	50.117 305	48.04 106	53.002 315	64.72 112	38.488 331	54.43 108
28.2	50.422 297	46.98 68	53.317 307	65.84 99	38.819 325	55.51 104
Sept. 7.2	50.719 285	46.30 28	53.624 295	66.83 82	39.144 313	56.55 97
17.2	51.004 269	46.02 13	53.919 279	67.65 64	39.457 297	57.52 89
27.2	51.273 249	46.15 52	54.198 261	68.29 46	39.754 279	58.41 78
Oct. 7.1	51.522 226	46.67 88	54.459 241	68.75 28	40.033 258	59.19 69
17.1	51.748 200	47.55 119	54.700 217	69.03 11	40.291 234	59.88 59
27.1	51.948 172	48.74 146	54.917 191	69.14 4	40.525 208	60.47 49
Nov. 6.0	52.120 141	50.20 164	55.108 163	69.10 16	40.733 177	60.96 41
16.0	52.261 108	51.84 177	55.271 131	68.94 26	40.910 145	61.37 33
25.9	52.369 74	53.61 181	55.402 97	68.68 32	41.055 109	61.70 26
Dec. 5.9	52.443 37	55.42 178	55.499 61	68.36 37	41.164 70	61.96 21
15.9	52.480 —	57.20 169	55.560 24	67.99 39	41.234 29	62.17 14
25.9	52.480 —	58.89 153	55.584 15	67.60 39	41.263 11	62.31 8
35.9	52.443 37	60.42 —	55.569 —	67.21 —	41.252 —	62.39 —
Mean Place	48.502	73.15	51.228	48.22	36.664	41.43
Sec δ , Tan δ	1.029	—0.244	1.024	+0.218	1.078	+0.402
α , α'	+2.8	+10.4	+3.3	+10.3	+3.5	+10.0
δ , δ'	—0.01	—0.9	+0.01	—0.9	+0.01	—0.9
Authority and Catalogue No.	B.J.	240	B.J.	241	N.A.	244

APPARENT PLACES OF STARS, 1931.

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AT UPPER TRANSIT AT GREENWICH.

Name Mag. Spect.	43 Tauri		o ¹ Eridani		α Horologii	
	5·67	G5	4·14	F2	3·83	Ko
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 04 ^m 05	[°] +19 ['] 25	^h 04 ^m 08	[°] —7 ['] 00	^h 04 ^m 11	[°] —42 ['] 27
Jan. 0·9	09·202 ^s	50·66 ["]	30·525 ^s	55·01 ["]	44·290 ^s	51·52 ["]
10·9	09·169 33	50·62 4	30·483 42	56·22 121	44·164 126	53·75 223
20·8	09·098 71	50·53 9	30·406 77	57·26 104	43·995 169	55·58 183
30·8	08·993 105	50·38 15	30·298 108	58·10 84	43·790 205	56·96 138
Feb. 9·8	08·859 134	50·18 20	30·163 135	58·73 63	43·555 235	57·86 90
	153	25	153	41	255	40
19·8	08·706 164	49·93 29	30·010 163	59·14 17	43·300 264	58·26 10
Mar. 1·7	08·542 163	49·64 32	29·847 163	59·31 7	43·036 263	58·16 61
11·7	08·379 152	49·32 34	29·684 154	59·24 31	42·773 251	57·55 107
21·7	08·227 132	48·98 33	29·530 136	58·93 55	42·522 227	56·48 152
31·6	08·095 101	48·65 29	29·394 109	58·38 79	42·295 195	54·96 194
Apr. 10·6	07·994 63	48·36 22	29·285 74	57·59 102	42·100 154	53·02 231
20·6	07·931 20	48·14 12	29·211 35	56·57 125	41·946 107	50·71 264
30·6	07·911 27	48·02 1	29·176 9	55·32 146	41·839 54	48·07 290
May 10·5	07·938 75	48·03 15	29·185 54	53·86 165	41·785 1	45·17 311
20·5	08·013 124	48·18 31	29·239 99	52·21 182	41·786 58	42·06 326
30·5	08·137 169	48·49 47	29·338 141	50·39 193	41·844 113	38·80 331
June 9·5	08·306 209	48·96 63	29·479 182	48·46 202	41·957 165	35·49 330
19·4	08·515 245	49·59 77	29·661 215	46·44 207	42·122 214	32·19 320
29·4	08·760 275	50·36 90	29·876 245	44·37 203	42·336 256	28·99 302
July 9·4	09·035 299	51·26 99	30·121 270	42·34 195	42·592 293	25·97 275
19·3	09·334 314	52·25 106	30·391 287	40·39 182	42·885 321	23·22 240
29·3	09·648 325	53·31 110	30·678 298	38·57 163	43·206 343	20·82 198
Aug. 8·3	09·973 328	54·41 109	30·976 303	36·94 138	43·549 355	18·84 149
18·3	10·301 327	55·50 107	31·279 303	35·56 110	43·904 360	17·35 97
28·2	10·628 320	56·57 99	31·582 297	34·46 78	44·264 356	16·38 40
Sept. 7·2	10·948 310	57·56 90	31·879 287	33·68 43	44·620 346	15·98 19
17·2	11·258 296	58·46 80	32·166 274	33·25 8	44·966 328	16·17 77
27·2	11·554 277	59·26 67	32·440 256	33·17 27	45·294 303	16·94 132
Oct. 7·1	11·831 257	59·93 56	32·696 236	33·44 59	45·597 273	18·26 183
17·1	12·088 234	60·49 43	32·932 213	34·03 89	45·870 237	20·09 226
27·1	12·322 209	60·92 33	33·145 187	34·92 113	46·107 196	22·35 260
Nov. 6·0	12·531 179	61·25 25	33·332 158	36·05 132	46·303 151	24·95 286
16·0	12·710 147	61·50 16	33·490 127	37·37 144	46·454 103	27·81 301
25·9	12·857 111	61·66 10	33·617 93	38·81 150	46·557 54	30·82 303
Dec. 5·9	12·968 74	61·76 4	33·710 57	40·31 149	46·611 3	33·85 294
15·9	13·042 33	61·80 —	33·767 19	41·80 143	46·614 48	36·79 275
25·9	13·075 7	61·80 4	33·786 18	43·23 132	46·566 98	39·54 246
35·9	13·068	61·76	33·768	44·55	46·468	42·00
Mean Place	08·514	41·72	29·702	58·34	42·778	48·68
Sec δ, Tan δ	1·060	+0·353	1·008	—0·123	1·356	—0·915
a, a'	+3·5	+9·6	+2·9	+9·4	+2·0	+9·1
b, b'	+0·01	—0·9	0·00	—0·9	—0·03	—0·9
Authority and Catalogue No.	N.A.	249	B.J.	251	B.J.	256

AT UPPER TRANSIT AT GREENWICH.

Name	α Reticuli		ν^1 Eridani		γ Tauri	
	3·36	G5	3·59	B9	3·86	Ko
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 04 ^m 13	[°] —62 ['] 38	^h 04 ^m 15	[°] —33 ['] 57	^h 04 ^m 15	[°] +15 ['] 27
Jan. 0·9	34·62	51·11	18·173	57·89	52·498	53·06
10·9	34·33	53·49	18·083	59·98	52·474	52·83
20·8	33·97	55·39	17·953	61·72	52·411	52·59
30·8	33·56	56·78	17·788	63·07	52·313	52·35
Feb. 9·8	33·12	57·61	17·595	63·99	52·186	52·10
19·8	32·65	57·88	17·382	64·45	52·038	51·84
Mar. 1·7	32·17	57·58	17·158	64·47	51·878	51·59
11·7	31·69	56·73	16·934	64·03	51·716	51·34
21·7	31·23	55·35	16·720	63·16	51·562	51·12
31·7	30·81	53·49	16·526	61·87	51·427	50·94
Apr. 10·6	30·44	51·18	16·362	60·17	51·321	50·82
20·6	30·13	48·48	16·234	58·14	51·250	50·79
30·6	29·89	45·45	16·150	55·79	51·221	50·88
May 10·5	29·72	42·16	16·114	53·17	51·237	51·10
20·5	29·64	38·69	16·128	50·34	51·300	51·47
30·5	29·64	35·09	16·194	47·35	51·410	51·99
June 9·5	29·73	31·46	16·309	44·28	51·564	52·65
19·4	29·90	27·90	16·472	41·20	51·759	53·45
29·4	30·16	24·49	16·677	38·19	51·990	54·38
July 9·4	30·48	21·31	16·921	35·32	52·252	55·41
19·4	30·86	18·46	17·196	32·68	52·537	56·50
29·3	31·29	16·02	17·496	30·34	52·840	57·63
Aug. 8·3	31·77	14·06	17·814	28·37	53·154	58·76
18·3	32·27	12·65	18·142	26·84	53·474	59·84
28·2	32·78	11·83	18·474	25·79	53·794	60·85
Sept. 7·2	33·30	11·64	18·804	25·27	54·110	61·77
17·2	33·81	12·08	19·124	25·29	54·416	62·55
27·2	34·28	13·15	19·428	25·85	54·710	63·18
Oct. 7·1	34·71	14·82	19·712	26·92	54·988	63·66
17·1	35·10	17·02	19·969	28·49	55·247	63·99
27·1	35·42	19·67	20·197	30·47	55·484	64·18
Nov. 6·1	35·66	22·68	20·390	32·80	55·696	64·24
16·0	35·83	25·94	20·545	35·37	55·881	64·20
25·9	35·92	29·31	20·660	38·10	56·035	64·07
Dec. 5·9	35·92	32·68	20·731	40·86	56·155	63·89
15·9	35·83	35·92	20·757	43·57	56·237	63·67
25·9	35·66	38·92	20·738	46·12	56·279	63·43
35·9	35·41	41·58	20·675	48·43	56·280	63·18
Mean Place	31·823	46·27	16·906	56·55	51·763	44·92
Sec δ , Tan δ	2·176	—1·933	1·206	—0·674	1·038	+0·277
α , α'	+0·8	+9·0	+2·3	+8·8	+3·4	+8·8
δ , δ'	—0·06	—0·9	—0·02	—0·9	+0·01	—0·9
Authority and Catalogue No.	B.J.	259	B.J.	261	A.N.	262

† Second transit, Nov. 25.

† First transit, Nov. 26.

APPARENT PLACES OF STARS, 1931.

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AT UPPER TRANSIT AT GREENWICH.

Name	ε Tauri		α Tauri (<i>Aldebaran</i>)		α Doradus	
Mag. Spect.	3·63	Ko	1·06	K5	3·47	Aop
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 04 ^m 24	[°] +19 ['] 01	^h 04 ^m 31	[°] +16 ['] 22	^h 04 ^m 32	[°] -55 ['] 10
Jan. 0·9	35·788 ^s	52·86 ["]	58·282 ^s	27·71 ["]	32·348 ^s	75·77 ["]
10·9	35·771 ^s	52·80 ["]	58·271 ^s	27·52 ["]	32·163 ^s	78·34 ["]
20·9	35·713 ^s	52·71 ["]	58·219 ^s	27·32 ["]	31·921 ^s	80·48 ["]
30·8	35·618 ^s	52·60 ["]	58·129 ^s	27·12 ["]	31·629 ^s	82·14 ["]
Feb. 9·8	35·492 ^s	52·46 ["]	58·008 ^s	26·92 ["]	31·298 ^s	83·29 ["]
19·8	35·343 ^s	52·27 ["]	57·862 ^s	26·71 ["]	30·940 ^s	83·90 ["]
Mar. 1·7	35·179 ^s	52·04 ["]	57·701 ^s	26·50 ["]	30·566 ^s	83·95 ["]
11·7	35·012 ^s	51·79 ["]	57·535 ^s	26·28 ["]	30·191 ^s	83·46 ["]
21·7	34·852 ^s	51·52 ["]	57·375 ^s	26·07 ["]	29·826 ^s	82·44 ["]
31·7	34·711 ^s	51·26 ["]	57·231 ^s	25·89 ["]	29·486 ^s	80·93 ["]
Apr. 10·6	34·597 ^s	51·02 ["]	57·113 ^s	25·76 ["]	29·181 ^s	78·96 ["]
20·6	34·518 ^s	50·83 ["]	57·030 ^s	25·70 ["]	28·924 ^s	76·58 ["]
30·6	34·481 ^s	50·74 ["]	56·987 ^s	25·73 ["]	28·722 ^s	73·83 ["]
May 10·6	34·490 ^s	50·75 ["]	56·989 ^s	25·88 ["]	28·582 ^s	70·78 ["]
20·5	34·547 ^s	50·88 ["]	57·037 ^s	26·15 ["]	28·510 ^s	67·50 ["]
30·5	34·652 ^s	51·16 ["]	57·133 ^s	26·56 ["]	28·506 ^s	64·06 ["]
June 9·5	34·802 ^s	51·58 ["]	57·273 ^s	27·11 ["]	28·572 ^s	60·54 ["]
19·4	34·994 ^s	52·14 ["]	57·456 ^s	27·79 ["]	28·706 ^s	57·03 ["]
29·4	35·223 ^s	52·84 ["]	57·674 ^s	28·59 ["]	28·904 ^s	53·61 ["]
July 9·4	35·484 ^s	53·65 ["]	57·925 ^s	29·49 ["]	29·161 ^s	50·38 ["]
19·4	35·770 ^s	54·54 ["]	58·202 ^s	30·46 ["]	29·471 ^s	47·42 ["]
29·3	36·075 ^s	55·50 ["]	58·499 ^s	31·46 ["]	29·825 ^s	44·83 ["]
Aug. 8·3	36·393 ^s	56·48 ["]	58·809 ^s	32·47 ["]	30·214 ^s	42·67 ["]
18·3	36·717 ^s	57·46 ["]	59·127 ^s	33·45 ["]	30·628 ^s	41·03 ["]
28·3	37·043 ^s	58·39 ["]	59·447 ^s	34·36 ["]	31·057 ^s	39·94 ["]
Sept. 7·2	37·366 ^s	59·26 ["]	59·765 ^s	35·17 ["]	31·491 ^s	39·47 ["]
17·2	37·681 ^s	60·03 ["]	60·077 ^s	35·87 ["]	31·918 ^s	39·63 ["]
27·2	37·984 ^s	60·70 ["]	60·378 ^s	36·43 ["]	32·329 ^s	40·41 ["]
Oct. 7·1	38·272 ^s	61·24 ["]	60·666 ^s	36·84 ["]	32·711 ^s	41·80 ["]
17·1	38·543 ^s	61·66 ["]	60·938 ^s	37·11 ["]	33·058 ^s	43·74 ["]
27·1	38·793 ^s	61·98 ["]	61·190 ^s	37·26 ["]	33·359 ^s	46·18 ["]
*Nov. 6·1	39·019 ^s	62·19 ["]	61·418 ^s	37·29 ["]	33·608 ^s	49·01 ["]
16·0	39·217 ^s	62·31 ["]	61·620 ^s	37·22 ["]	33·798 ^s	52·14 ["]
26·0	39·384 ^s	62·38 ["]	61·791 ^s	37·09 ["]	33·923 ^s	55·45 ["]
Dec. 5·9	39·515 ^s	62·39 ["]	61·928 ^s	36·91 ["]	33·980 ^s	58·80 ["]
15·9	39·609 ^s	62·37 ["]	62·026 ^s	36·70 ["]	33·968 ^s	62·09 ["]
25·9	39·662 ^s	62·32 ["]	62·085 ^s	36·48 ["]	33·888 ^s	65·20 ["]
35·9	39·672 ^s	62·26 ["]	62·101 ^s	36·27 ["]	33·742 ^s	68·01 ["]
Mean Place	35·018	44·01	57·484	19·36	30·143	73·16
Sec δ, Tan δ	1·058	+0·345	1·042	+0·294	1·752	-1·438
α, α'	+3·5	+8·1	+3·4	+7·5	+1·3	+7·5
b, b'	+0·01	-0·9	+0·01	-0·9	-0·04	-0·9
Authority and Catalogue No.	B.J.	270	B.J.	278	B.J.	279

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name	53 Eridani		τ Tauri		μ Eridani	
	3.98	Ko	4.33	B5	4.18	B5
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ^m 04 35	[°] ['] -14 25	^h ^m 04 38	[°] ['] +22 49	^h ^m 04 42	[°] ['] -3 22
Jan. 0.9	02.122 ^s	72.55 ["]	06.815 ^s	43.62 ["]	03.897 ^s	42.36 ["]
10.9	02.090 ^s	74.17 ["]	06.809 ^s	43.77 ["]	03.883 ^s	43.54 ["]
20.9	02.019 ^s	75.58 ["]	06.760 ^s	43.87 ["]	03.830 ^s	44.57 ["]
30.8	01.912 ^s	76.73 ["]	06.670 ^s	43.93 ["]	03.741 ^s	45.44 ["]
Feb. 9.8	01.775 ^s	77.60 ["]	06.546 ^s	43.92 ["]	03.620 ^s	46.12 ["]
19.8	01.616 ^s	78.18 ["]	06.396 ^s	43.84 ["]	03.475 ^s	46.61 ["]
Mar. 1.8	01.442 ^s	78.45 ["]	06.228 ^s	43.68 ["]	03.315 ^s	46.89 ["]
11.7	01.264 ^s	78.41 ["]	06.054 ^s	43.45 ["]	03.149 ^s	46.97 ["]
21.7	01.091 ^s	78.07 ["]	05.886 ^s	43.17 ["]	02.986 ^s	46.84 ["]
31.7	00.932 ^s	77.42 ["]	05.734 ^s	42.84 ["]	02.837 ^s	46.50 ["]
Apr. 10.6	00.798 ^s	76.48 ["]	05.608 ^s	42.50 ["]	02.711 ^s	45.94 ["]
20.6	00.695 ^s	75.27 ["]	05.518 ^s	42.18 ["]	02.615 ^s	45.18 ["]
30.6	00.630 ^s	73.79 ["]	05.469 ^s	41.90 ["]	02.556 ^s	44.21 ["]
May 10.6	00.607 ^s	72.07 ["]	05.466 ^s	41.70 ["]	02.539 ^s	43.04 ["]
20.5	00.628 ^s	70.14 ["]	05.511 ^s	41.60 ["]	02.565 ^s	41.68 ["]
30.5	00.695 ^s	68.05 ["]	05.605 ^s	41.62 ["]	02.636 ^s	40.17 ["]
June 9.5	00.806 ^s	65.83 ["]	05.746 ^s	41.77 ["]	02.750 ^s	38.52 ["]
19.5	00.958 ^s	63.53 ["]	05.931 ^s	42.05 ["]	02.904 ^s	36.78 ["]
29.4	01.148 ^s	61.20 ["]	06.153 ^s	42.48 ["]	03.095 ^s	34.98 ["]
July 9.4	01.371 ^s	58.93 ["]	06.410 ^s	43.03 ["]	03.317 ^s	33.18 ["]
19.4	01.621 ^s	56.76 ["]	06.694 ^s	43.68 ["]	03.566 ^s	31.42 ["]
29.3	01.893 ^s	54.76 ["]	07.000 ^s	44.40 ["]	03.837 ^s	29.76 ["]
Aug. 8.3	02.181 ^s	53.00 ["]	07.320 ^s	45.18 ["]	04.123 ^s	28.24 ["]
18.3	02.479 ^s	51.52 ["]	07.649 ^s	45.99 ["]	04.418 ^s	26.93 ["]
28.3	02.781 ^s	50.40 ["]	07.982 ^s	46.79 ["]	04.718 ^s	25.87 ["]
Sept. 7.2	03.082 ^s	49.65 ["]	08.314 ^s	47.56 ["]	05.018 ^s	25.09 ["]
17.2	03.378 ^s	49.31 ["]	08.640 ^s	48.28 ["]	05.313 ^s	24.62 ["]
27.2	03.663 ^s	49.38 ["]	08.956 ^s	48.92 ["]	05.600 ^s	24.48 ["]
Oct. 7.2	03.935 ^s	49.87 ["]	09.259 ^s	49.49 ["]	05.875 ^s	24.66 ["]
17.1	04.189 ^s	50.76 ["]	09.547 ^s	49.97 ["]	06.134 ^s	25.16 ["]
27.1	04.421 ^s	51.99 ["]	09.814 ^s	50.38 ["]	06.374 ^s	25.93 ["]
Nov. 6.1	04.629 ^s	53.51 ["]	10.059 ^s	50.72 ["]	06.591 ^s	26.93 ["]
16.0	04.809 ^s	55.26 ["]	10.276 ^s	51.00 ["]	06.783 ^s	28.13 ["]
26.0	04.956 ^s	57.17 ["]	10.461 ^s	51.24 ["]	06.945 ^s	29.46 ["]
Dec. 5.9	05.068 ^s	59.15 ["]	10.611 ^s	51.45 ["]	07.073 ^s	30.86 ["]
15.9	05.142 ^s	61.13 ["]	10.721 ^s	51.63 ["]	07.165 ^s	32.27 ["]
25.9	05.177 ^s	63.03 ["]	10.789 ^s	51.80 ["]	07.218 ^s	33.64 ["]
35.9	05.170 ^s	64.80 ["]	10.812 ^s	51.95 ["]	07.229 ^s	34.92 ["]
Mean Place	01.144	75.46	05.984	34.17	03.002	47.36
Sec δ , Tan δ	1.033	-0.257	1.085	+0.421	1.002	-0.059
a, a'	+2.8	+7.3	+3.6	+7.0	+3.0	+6.7
b, b'	-0.01	-0.9	+0.01	-0.9	0.00	-0.9
Authority and Catalogue No.	B.J.	282	B.J.	284	A.N.	288

AT UPPER TRANSIT AT GREENWICH.

Name	π^3 Orionis		9 Camelopardi		Aurigæ	
Mag. Spect.	3·3I	F8	4·38	Bo	2·90	K2
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ₀₄ ^m ₄₆	[°] ₊₆ ['] ₅₀	^h ₀₄ ^m ₄₇	[°] ₊₆₆ ['] ₁₃	^h ₀₄ ^m ₅₂	[°] ₊₃₃ ['] ₀₃
Jan. 0·9	06·374 ^s	38·93	12·58 ^s	55·94	30·692 ^s	41·69
10·9	06·373 ⁱ	38·24 ⁶⁹	12·50 ⁸	58·27 ²³³	30·697 ⁵	42·39 ⁷⁰
20·9	06·330 ⁴³	37·62 ⁶²	12·31 ¹⁹	60·33 ²⁰⁶	30·652 ⁴⁵	43·01 ⁶²
30·8	06·249 ⁸¹	37·09 ⁵³	12·03 ²⁸	62·04 ¹⁷¹	30·561 ⁹¹	43·51 ⁵⁰
Feb. 9·8	06·135 ¹¹⁴	36·65 ⁴⁴	11·68 ³⁵	63·33 ¹²⁹	30·429 ¹³²	43·87 ³⁶
19·8	05·997 ¹³⁸	36·31 ³⁴	11·27 ⁴¹	64·17 ⁸⁴	30·266 ¹⁶³	44·06 ¹⁹
Mar. 1·8	05·841 ¹⁵⁶	36·07 ²⁴	10·83 ⁴⁴	64·52 ³⁵	30·082 ¹⁸⁴	44·07 ¹
11·7	05·678 ¹⁶³	35·93 ¹⁴	10·38 ⁴⁵	64·37 ¹⁵	29·888 ¹⁹⁴	43·90 ¹⁷
21·7	05·518 ¹⁶⁰	35·91 ²	09·94 ⁴⁴	63·74 ⁶³	29·697 ¹⁹¹	43·57 ³³
31·7	05·372 ¹⁴⁶	35·99 ⁸	09·53 ⁴¹	62·66 ¹⁰⁸	29·522 ¹⁷⁵	43·08 ⁴⁹
Apr. 10·6	05·249 ¹²³	36·20 ²¹	09·18 ³⁵	61·19 ¹⁴⁷	29·373 ¹⁴⁹	42·48 ⁶⁰
20·6	05·157 ⁹²	36·55 ³⁵	08·91 ²⁷	59·40 ¹⁷⁹	29·261 ¹¹²	41·79 ⁶⁹
30·6	05·102 ⁵⁵	37·04 ⁴⁹	08·72 ¹⁹	57·36 ²⁰⁴	29·193 ⁶⁸	41·06 ⁷³
May 10·6	05·089 ¹³	37·68 ⁶⁴	08·63 ⁹	55·15 ²²¹	29·174 ¹⁹	40·33 ⁷³
20·5	05·120 ³¹	38·47 ⁷⁹	08·64 ¹	52·86 ²²⁹	29·207 ³³	39·65 ⁶⁸
30·5	05·196 ⁷⁶	39·41 ⁹⁴	08·76 ¹²	50·57 ²²⁹	29·294 ⁸⁷	39·04 ⁶¹
June 9·5	05·315 ¹¹⁹	40·47 ¹⁰⁶	08·98 ²²	48·36 ²²¹	29·431 ¹³⁷	38·54 ⁵⁰
19·5	05·475 ¹⁶⁰	41·65 ¹¹⁸	09·30 ³²	46·30 ²⁰⁶	29·617 ¹⁸⁶	38·17 ³⁷
29·4	05·672 ¹⁹⁷	42·92 ¹²⁷	09·71 ⁴¹	44·42 ¹⁸⁸	29·845 ²²⁸	37·95 ²²
July 9·4	05·901 ²²⁹	44·22 ¹³⁰	10·19 ⁴⁸	42·81 ¹⁶¹	30·112 ²⁶⁷	37·87 ⁸
19·4	06·156 ²⁵⁵	45·55 ¹³³	10·74 ⁵⁵	41·49 ¹³²	30·411 ²⁹⁹	37·93 ⁶
29·3	06·434 ²⁷⁸	46·84 ¹²⁹	11·34 ⁶⁰	40·49 ¹⁰⁰	30·735 ³²⁴	38·14 ²¹
Aug. 8·3	06·725 ²⁹¹	48·06 ¹²²	11·98 ⁶⁴	39·83 ⁶⁶	31·077 ³⁴²	38·47 ³³
18·3	07·027 ³⁰²	49·16 ¹¹⁰	12·66 ⁶⁸	39·53 ³⁰	31·431 ³⁵⁴	38·91 ⁴⁴
28·3	07·334 ³⁰⁷	50·11 ⁹⁵	13·36 ⁷⁰	39·58 ⁵	31·793 ³⁶²	39·43 ⁵²
Sept. 7·2	07·641 ³⁰⁷	50·87 ⁷⁶	14·06 ⁷⁰	39·98 ⁴⁰	32·156 ³⁶³	40·03 ⁶⁰
17·2	07·943 ³⁰²	51·42 ⁵⁵	14·75 ⁶⁹	40·73 ⁷⁵	32·515 ³⁵⁹	40·67 ⁶⁴
27·2	08·239 ²⁹⁶	51·74 ³²	15·43 ⁶⁸	41·81 ¹⁰⁸	32·867 ³⁵²	41·35 ⁶⁸
Oct. 7·2	08·522 ²⁸³	51·83 ⁹	16·09 ⁶⁶	43·21 ¹⁴⁰	33·207 ³⁴⁰	42·06 ⁷¹
17·1	08·791 ²⁶⁹	51·70 ¹³	16·71 ⁶²	44·90 ¹⁶⁹	33·532 ³²⁵	42·78 ⁷²
27·1	09·042 ²⁵¹	51·35 ³⁵	17·28 ⁵⁷	46·86 ¹⁹⁶	33·838 ³⁰⁶	43·52 ⁷⁴
Nov. 6·1	09·272 ²³⁰	50·84 ⁵¹	17·80 ⁵²	49·06 ²²⁰	34·119 ²⁸¹	44·27 ⁷⁵
16·0	09·476 ²⁰⁴	50·18 ⁶⁶	18·25 ⁴⁵	51·45 ²³⁹	34·372 ²⁵³	45·04 ⁷⁷
26·0	09·652 ¹⁷⁶	49·43 ⁷⁵	18·62 ³⁷	53·99 ²⁵⁴	34·590 ²¹⁸	45·82 ⁷⁸
Dec. 5·9	09·794 ¹⁴²	48·62 ⁸¹	18·90 ²⁸	56·61 ²⁶²	34·770 ¹⁸⁰	46·61 ⁷⁹
15·9	09·900 ¹⁰⁶	47·79 ⁸³	19·09 ¹⁹	59·25 ²⁶⁴	34·906 ¹³⁶	47·40 ⁷⁹
25·9	09·966 ⁶⁶	46·98 ⁸¹	19·17 ⁸	61·83 ²⁵⁸	34·994 ⁸⁸	48·16 ⁷⁶
35·9	09·990 ²⁴	46·21 ⁷⁷	19·15 ²	64·27 ²⁴⁴	35·032 ³⁸	48·88 ⁷²
Mean Place	05·515	32·16	10·576	40·99	29·740	30·88
Sec δ, Tan δ	1·007	+0·120	2·481	+2·270	1·193	+0·651
α, α'	+3·2	+6·4	+6·0	+6·3	+3·9	+5·8
δ, δ'	0·00	-0·9	+0·05	-1·0	+0·01	-1·0
Authority and Catalogue No.	N.A.	291	B.J.	293	B.J.	299

† Second transit, Dec. 5.

AT UPPER TRANSIT AT GREENWICH.

Name	ε Aurigæ		ι Tauri		η Aurigæ	
	Var.	F5p	4.70	A5	3.28	B3
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
Mean Solar Date						
	^h 04 ^m 57	[°] +43 ['] 43	^h 04 ^m 58	[°] +21 ['] 29	^h 05 ^m 01	[°] +41 ['] 08
Jan. 0.9	01.872	35.32	58.970	43.72	41.379	46.37
10.9	01.874 ² / ₅₆	36.61 ¹²⁹	58.983 ¹³ / ₃₂	43.79 7	41.389 ¹⁰ / ₄₇	47.53 ¹¹⁶
20.9	01.818	37.75 ¹¹⁴	58.951	43.86	41.342	48.57 ¹⁰⁴
30.8	01.707 ¹¹¹	38.70 ⁹⁵	58.876 ⁷⁵	43.90 4	41.243 ⁹⁹	49.44 ⁸⁷
Feb. 9.8	01.550 ¹⁵⁷	39.43 ⁷³	58.764 ¹¹²	43.91 ¹ / ₄	41.098 ¹⁴⁵	50.11 ⁶⁷
19.8	01.355 ¹⁹⁵	39.89 ⁴⁶	58.621 ¹⁴³	43.87 4	40.916 ¹⁸²	50.54 ⁴³
Mar. 1.8	01.136 ²¹⁹	40.06 ¹⁷	58.459 ¹⁶²	43.79 8	40.708 ²⁰⁸	50.72 ¹⁸
11.7	00.906 ²³⁰	39.94 ¹²	58.286 ¹⁷³	43.65 14	40.489 ²¹⁹	50.64 ⁸
21.7	00.678 ²²⁸	39.55 ³⁹	58.114 ¹⁷²	43.46 19	40.271 ²¹⁸	50.30 ³⁴
31.7	00.468 ²¹⁰	38.90 ⁶⁵	57.955 ¹⁵⁹	43.24 22	40.069 ²⁰²	49.72 ⁵⁸
Apr. 10.7	00.286 ¹⁸²	38.04 ⁸⁶	57.819 ¹³⁶	43.00 24	39.894 ¹⁷⁵	48.95 ⁷⁷
20.6	00.147 ¹³⁹	36.99 ¹⁰⁵	57.715 ¹⁰⁴	42.77 23	39.759 ¹³⁵	48.02 ⁹³
30.6	00.057 ⁹⁰	35.82 ¹¹⁷	57.650 ⁶⁵	42.58 19	39.670 ⁸⁹	46.97 ¹⁰⁵
May 10.6	00.024 ³³	34.58 ¹²⁴	57.628 ²²	42.45 13	39.635 ³⁵	45.87 ¹¹⁰
20.5	00.050 ²⁶	33.34 ¹²⁴	57.654 ²⁶	42.40 ⁵ / ₆	39.657 ²²	44.76 ¹¹¹
30.5	00.137 ⁸⁷	32.13 ¹²¹	57.727 ⁷³	42.46 6	39.737 ⁸⁰	43.68 ¹⁰⁸
June 9.5	00.283 ¹⁴⁶	31.01 ¹¹²	57.846 ¹¹⁹	42.62 16	39.874 ¹³⁷	42.69 ⁹⁹
19.5	00.484 ²⁰¹	30.02 ⁹⁹	58.010 ¹⁶⁴	42.90 28	40.064 ¹⁹⁰	41.82 ⁸⁷
29.4	00.736 ²⁵²	29.18 ⁸⁴	58.212 ²⁰²	43.30 40	40.303 ²³⁹	41.09 ⁷³
July 9.4	01.032 ²⁹⁶	28.51 ⁶⁷	58.450 ²³⁸	43.79 49	40.585 ²⁸²	40.52 ⁵⁷
19.4	01.365 ³³³	28.04 ⁴⁷	58.717 ²⁶⁷	44.37 58	40.903 ³¹⁸	40.13 ³⁹
29.4	01.729 ³⁶⁴	27.77 ²⁷	59.007 ²⁹⁰	45.01 64	41.251 ³⁴⁸	39.92 ²¹
Aug. 8.3	02.115 ³⁸⁶	27.69 ⁸	59.315 ³⁰⁸	45.69 68	41.621 ³⁷⁰	39.88 ⁴
18.3	02.518 ⁴⁰³	27.80 ¹¹	59.635 ³²⁰	46.37 68	42.008 ³⁸⁷	40.00 ¹²
28.3	02.929 ⁴¹¹	28.09 ²⁹	59.962 ³²⁷	47.04 67	42.404 ³⁹⁶	40.29 ²⁹
Sept. 7.2	03.344 ⁴¹⁵	28.55 ⁴⁶	60.290 ³²⁸	47.66 62	42.803 ³⁹⁹	40.72 ⁴³
17.2	03.756 ⁴¹²	29.17 ⁶²	60.617 ³²⁷	48.22 56	43.201 ³⁹⁸	41.27 ⁵⁵
27.2	04.160 ⁴⁰⁴	29.92 ⁷⁵	60.937 ³²⁰	48.69 47	43.592 ³⁹¹	41.94 ⁶⁷
Oct. 7.2	04.552 ³⁹²	30.81 ⁸⁹	61.247 ³¹⁰	49.07 38	43.973 ³⁸¹	42.72 ⁷⁸
17.1	04.927 ³⁷⁵	31.82 ¹⁰¹	61.545 ²⁹⁸	49.37 30	44.338 ³⁶⁵	43.60 ⁸⁸
27.1	05.280 ³⁵³	32.93 ¹¹¹	61.826 ²⁸¹	49.58 21	44.682 ³⁴⁴	44.57 ⁹⁷
Nov. 6.1	05.605 ³²⁵	34.14 ¹²¹	62.086 ²⁶⁰	49.73 15	45.001 ³¹⁹	45.62 ¹⁰⁵
16.1	05.897 ²⁹²	35.44 ¹³⁰	62.321 ²³⁵	49.82 9	45.289 ²⁸⁸	46.75 ¹¹³
26.0	06.150 ²⁵³	36.80 ¹³⁶	62.525 ²⁰⁴	49.88 6	45.539 ²⁵⁰	47.94 ¹¹⁹
Dec. 6.0	06.356 ²⁰⁶	38.20 ¹⁴⁰	62.696 ¹⁷¹	49.92 4	45.745 ²⁰⁶	49.17 ¹²³
15.9	06.511 ¹⁵⁵	39.62 ¹⁴²	62.827 ¹³¹	49.96 4	45.903 ¹⁵⁸	50.42 ¹²⁵
25.9	06.610 ⁹⁹	41.02 ¹⁴⁰	62.916 ⁸⁹	50.00 4	46.006 ¹⁰³	51.65 ¹²³
35.9	06.649 ³⁹	42.35 ¹³³	62.959 ⁴³	50.05 5	46.054 ⁴⁸	52.84 ¹¹⁹
Mean Place	00.750	23.24	58.066	34.69	40.280	34.78
Sec δ, Tan δ	1.384	+0.956	1.075	+0.394	1.328	+0.874
a, a'	+4.3	+5.4	+3.6	+5.3	+4.2	+5.0
b, b'	+0.02	-1.0	+0.01	-1.0	+0.01	-1.0
Authority and Catalogue No.	B.J.	301	B.J.	305	B.J.	307

† First transit, Dec. 6.

APPARENT PLACES OF STARS, 1931.

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AT UPPER TRANSIT AT GREENWICH.

Name	ε Leporis		β Eridani		μ Leporis	
	3.29	K5	2.92	A3	3.30	A0p
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 05 ^m 02	[°] —22 ['] 27	^h 05 ^m 04	[°] —5 ['] 10	^h 05 ^m 09	[°] —16 ['] 16
Jan. 0.9	33.444 ^s	42.25 ["]	28.304 ^s	22.23 ["]	50.840 ^s	65.43 ["]
10.9	33.421 ^s	44.34 ["]	28.306 ^s	23.58 ["]	50.833 ^s	67.30 ["]
20.9	33.354 ^s	46.17 ["]	28.267 ^s	24.77 ["]	50.783 ^s	68.96 ["]
30.9	33.248 ^s	47.70 ["]	28.189 ^s	25.77 ["]	50.693 ^s	70.37 ["]
Feb. 9.8	33.107 ^s	48.89 ["]	28.076 ^s	26.57 ["]	50.569 ^s	71.48 ["]
19.8	32.939 ^s	49.73 ["]	27.936 ^s	27.15 ["]	50.415 ^s	72.28 ["]
Mar. 1.8	32.751 ^s	50.20 ["]	27.776 ^s	27.51 ["]	50.241 ^s	72.76 ["]
11.7	32.554 ^s	50.29 ["]	27.606 ^s	27.65 ["]	50.058 ^s	72.91 ["]
21.7	32.358 ^s	50.01 ["]	27.436 ^s	27.56 ["]	49.873 ^s	72.74 ["]
31.7	32.173 ^s	49.36 ["]	27.277 ^s	27.25 ["]	49.698 ^s	72.25 ["]
Apr. 10.7	32.009 ^s	48.36 ["]	27.136 ^s	26.71 ["]	49.543 ^s	71.45 ["]
20.6	31.874 ^s	47.03 ["]	27.025 ^s	25.95 ["]	49.414 ^s	70.34 ["]
30.6	31.774 ^s	45.38 ["]	26.948 ^s	24.98 ["]	49.320 ^s	68.96 ["]
May 10.6	31.715 ^s	43.47 ["]	26.910 ^s	23.80 ["]	49.266 ^s	67.31 ["]
20.6	31.700 ^s	41.31 ["]	26.915 ^s	22.43 ["]	49.253 ^s	65.45 ["]
30.5	31.731 ^s	38.96 ["]	26.963 ^s	20.90 ["]	49.285 ^s	63.39 ["]
June 9.5	31.808 ^s	36.46 ["]	27.054 ^s	19.24 ["]	49.361 ^s	61.19 ["]
19.5	31.928 ^s	33.88 ["]	27.187 ^s	17.47 ["]	49.479 ^s	58.89 ["]
29.4	32.087 ^s	31.27 ["]	27.357 ^s	15.64 ["]	49.636 ^s	56.56 ["]
July 9.4	32.285 ^s	28.72 ["]	27.560 ^s	13.81 ["]	49.829 ^s	54.25 ["]
19.4	32.514 ^s	26.29 ["]	27.793 ^s	12.03 ["]	50.053 ^s	52.04 ["]
29.4	32.770 ^s	24.05 ["]	28.049 ^s	10.35 ["]	50.302 ^s	49.98 ["]
Aug. 8.3	33.047 ^s	22.08 ["]	28.322 ^s	08.82 ["]	50.572 ^s	48.15 ["]
18.3	33.340 ^s	20.43 ["]	28.609 ^s	07.50 ["]	50.857 ^s	46.59 ["]
28.3	33.642 ^s	19.17 ["]	28.904 ^s	06.44 ["]	51.153 ^s	45.38 ["]
Sept. 7.3	33.949 ^s	18.35 ["]	29.202 ^s	05.67 ["]	51.452 ^s	44.56 ["]
17.2	34.255 ^s	18.00 ["]	29.499 ^s	05.23 ["]	51.753 ^s	44.16 ["]
27.2	34.555 ^s	18.12 ["]	29.791 ^s	05.13 ["]	52.049 ^s	44.19 ["]
Oct. 7.2	34.845 ^s	18.74 ["]	30.073 ^s	05.38 ["]	52.337 ^s	44.66 ["]
17.1	35.120 ^s	19.81 ["]	30.344 ^s	05.96 ["]	52.612 ^s	45.54 ["]
27.1	35.376 ^s	21.29 ["]	30.598 ^s	06.84 ["]	52.869 ^s	46.81 ["]
Nov. 6.1	35.608 ^s	23.14 ["]	30.832 ^s	07.98 ["]	53.106 ^s	48.42 ["]
16.1	35.811 ^s	25.26 ["]	31.042 ^s	09.33 ["]	53.317 ^s	50.29 ["]
26.0	35.982 ^s	27.59 ["]	31.223 ^s	10.82 ["]	53.497 ^s	52.35 ["]
Dec. 6.0	36.116 ^s	30.03 ["]	31.372 ^s	12.40 ["]	53.642 ^s	54.51 ["]
15.9	36.209 ^s	32.49 ["]	31.484 ^s	13.99 ["]	53.749 ^s	56.70 ["]
25.9	36.259 ^s	34.88 ["]	31.556 ^s	15.55 ["]	53.814 ^s	58.84 ["]
35.9	36.264 ^s	37.11 ["]	31.586 ^s	17.01 ["]	53.835 ^s	60.85 ["]
Mean Place	32.301	45.23	27.341	27.51	49.767	69.48
Sec δ, Tan δ	1.082	—0.413	1.004	—0.091	1.042	—0.292
a, a'	+2.5	+5.0	+3.0	+4.8	+2.7	+4.4
b, b'	—0.01	—1.0	0.00	—1.0	0.00	—1.0
Authority and Catalogue No.	B.J.	308	B.J.	310	N.A.	316

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name	β Orionis (<i>Rigel</i>)		α Aurigæ (<i>Capella</i>)		σ Orionis	
	Mag. Spect.	B8p	0.21	Go	4.65	B3
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ₀₅ ^m ₁₁	[°] _{—8} ['] ₁₆	^h ₀₅ ^m ₁₁	[°] ₊₄₅ ['] ₅₅	^h ₀₅ ^m ₁₈	[°] _{—0} ['] ₂₆
Jan. 0.9	14.215 ^s ₆	43.09 ["]	36.524 ^s ₁₈	59.26 ["] ₁₄₂	15.230 ^s ₁₉	50.85 ["] ₁₁₅
10.9	14.221 ^s ₃₇	44.62 ["] ₁₅₃	36.542 ^s ₄₃	60.68 ["] ₁₂₉	15.249 ^s ₂₅	52.00 ["] ₁₀₃
20.9	14.184 ^s ₇₈	45.97 ["] ₁₁₃	36.499 ^s ₁₀₃	61.97 ["] ₁₁₂	15.224 ^s ₆₆	53.03 ["] ₈₇
30.9	14.106 ^s ₁₁₃	47.10 ["] ₉₁	36.396 ^s ₁₅₄	63.09 ["] ₈₉	15.158 ^s ₁₀₁	53.90 ["] ₇₀
Feb. 9.8	13.993 ^s ₁₄₁	48.01 ["] ₆₇	36.242 ^s ₁₉₅	63.98 ["] ₆₂	15.057 ^s ₁₃₂	54.60 ["] ₅₃
19.8	13.852 ^s ₁₆₂	48.68 ["] ₄₁	36.047 ^s ₂₂₅	64.60 ["] ₃₂	14.925 ^s ₁₅₄	55.13 ["] ₃₄
Mar. 1.8	13.690 ^s ₁₇₃	49.09 ["] ₁₆	35.822 ^s ₂₄₀	64.92 ["] ₁	14.771 ^s ₁₆₆	55.47 ["] ₁₇
11.7	13.517 ^s ₁₇₃	49.25 ["] ₁₀	35.582 ^s ₂₄₁	64.93 ["] ₂₉	14.605 ^s ₁₆₈	55.64 ["] ₂
21.7	13.344 ^s ₁₆₄	49.15 ["] ₃₅	35.341 ^s ₂₂₆	64.64 ["] ₅₇	14.437 ^s ₁₆₀	55.62 ["] ₂₀
31.7	13.180 ^s ₁₄₇	48.80 ["] ₆₀	35.115 ^s ₂₀₀	64.07 ["] ₈₃	14.277 ^s ₁₄₂	55.42 ["] ₃₈
Apr. 10.7	13.033 ^s ₁₁₈	48.20 ["] ₈₄	34.915 ^s ₁₅₉	63.24 ["] ₁₀₄	14.135 ^s ₁₁₅	55.04 ["] ₅₆
20.6	12.915 ^s ₈₅	47.36 ["] ₁₀₈	34.756 ^s ₁₀₉	62.20 ["] ₁₂₀	14.020 ^s ₈₃	54.48 ["] ₇₅
30.6	12.830 ^s ₄₆	46.28 ["] ₁₂₉	34.647 ^s ₅₃	61.00 ["] ₁₃₀	13.937 ^s ₄₄	53.73 ["] ₉₃
May 10.6	12.784 ^s ₄	44.99 ["] ₁₅₀	34.594 ^s ₈	59.70 ["] ₁₃₅	13.893 ^s ₂	52.80 ["] ₁₀₉
20.6	12.780 ^s ₄₀	43.49 ["] ₁₆₆	34.602 ^s ₆₉	58.35 ["] ₁₃₄	13.891 ^s ₄₀	51.71 ["] ₁₂₄
30.5	12.820 ^s ₈₃	41.83 ["] ₁₈₁	34.671 ^s ₁₃₁	57.01 ["] ₁₂₉	13.931 ^s ₈₂	50.47 ["] ₁₃₇
June 9.5	12.903 ^s ₁₂₃	40.02 ["] ₁₉₀	34.802 ^s ₁₈₈	55.72 ["] ₁₁₉	14.013 ^s ₁₂₅	49.10 ["] ₁₄₈
19.5	13.026 ^s ₁₆₂	38.12 ["] ₁₉₇	34.990 ^s ₂₄₂	54.53 ["] ₁₀₆	14.138 ^s ₁₆₁	47.62 ["] ₁₅₄
29.4	13.188 ^s ₁₉₆	36.15 ["] ₁₉₆	35.232 ^s ₂₈₉	53.47 ["] ₈₉	14.299 ^s ₁₉₆	46.08 ["] ₁₅₆
July 9.4	13.384 ^s ₂₂₆	34.19 ["] ₁₉₀	35.521 ^s ₃₃₀	52.58 ["] ₇₁	14.495 ^s ₂₂₅	44.52 ["] ₁₅₄
19.4	13.610 ^s ₂₅₀	32.29 ["] ₁₇₉	35.851 ^s ₃₆₄	51.87 ["] ₅₂	14.720 ^s ₂₅₀	42.98 ["] ₁₄₇
29.4	13.860 ^s ₂₆₉	30.50 ["] ₁₆₂	36.215 ^s ₃₉₀	51.35 ["] ₃₃	14.970 ^s ₂₆₈	41.51 ["] ₁₃₅
Aug. 8.3	14.129 ^s ₂₈₃	28.88 ["] ₁₃₈	36.605 ^s ₄₀₉	51.02 ["] ₁₃	15.238 ^s ₂₈₃	40.16 ["] ₁₁₈
18.3	14.412 ^s ₂₉₃	27.50 ["] ₁₁₁	37.014 ^s ₄₂₂	50.89 ["] ₇	15.521 ^s ₂₉₃	38.98 ["] ₉₇
28.3	14.705 ^s ₂₉₇	26.39 ["] ₇₈	37.436 ^s ₄₂₈	50.96 ["] ₂₄	15.814 ^s ₂₉₇	38.01 ["] ₇₁
Sept. 7.3	15.002 ^s ₂₉₇	25.61 ["] ₄₄	37.864 ^s ₄₂₉	51.20 ["] ₄₂	16.111 ^s ₃₀₀	37.30 ["] ₄₄
17.2	15.299 ^s ₂₉₄	25.17 ["] ₆	38.293 ^s ₄₂₄	51.62 ["] ₅₉	16.411 ^s ₂₉₆	36.86 ["] ₁₄
27.2	15.593 ^s ₂₈₄	25.11 ["] ₃₂	38.717 ^s ₄₁₃	52.21 ["] ₇₄	16.707 ^s ₂₈₉	36.72 ["] ₁₇
Oct. 7.2	15.877 ^s ₂₇₄	25.43 ["] ₆₇	39.130 ^s ₄₀₀	52.95 ["] ₈₈	16.996 ^s ₂₈₀	36.89 ["] ₄₆
17.1	16.151 ^s ₂₅₈	26.10 ["] ₉₉	39.530 ^s ₃₇₉	53.83 ["] ₁₀₃	17.276 ^s ₂₆₅	37.35 ["] ₇₃
27.1	16.409 ^s ₂₃₉	27.09 ["] ₁₂₉	39.909 ^s ₃₅₂	54.86 ["] ₁₁₅	17.541 ^s ₂₄₇	38.08 ["] ₉₆
Nov. 6.1	16.648 ^s ₂₁₄	28.38 ["] ₁₅₁	40.261 ^s ₃₁₉	56.01 ["] ₁₂₇	17.788 ^s ₂₂₆	39.04 ["] ₁₁₄
16.1	16.862 ^s ₁₈₆	29.89 ["] ₁₆₇	40.580 ^s ₂₇₉	57.28 ["] ₁₃₈	18.014 ^s ₁₉₈	40.18 ["] ₁₂₈
26.0	17.048 ^s ₁₅₃	31.56 ["] ₁₇₆	40.859 ^s ₂₃₃	58.66 ["] ₁₄₄	18.212 ^s ₁₆₅	41.46 ["] ₁₃₅
Dec. 6.0	17.201 ^s ₁₁₆	33.32 ["] ₁₇₈	41.092 ^s ₁₇₉	60.10 ["] ₁₄₉	18.377 ^s ₁₃₀	42.81 ["] ₁₃₇
15.9	17.317 ^s ₇₅	35.10 ["] ₁₇₄	41.271 ^s ₁₂₁	61.59 ["] ₁₅₀	18.507 ^s ₈₉	44.18 ["] ₁₃₃
25.9	17.392 ^s ₃₃	36.84 ["] ₁₆₄	41.392 ^s ₅₉	63.09 ["] ₁₄₅	18.596 ^s ₄₆	45.51 ["] ₁₂₆
35.9	17.425 ^s	38.48 ["]	41.451 ^s	64.54 ["]	18.642 ^s	46.77 ["]
Mean Place	13.217	48.15	35.276	47.51	14.265	57.01
Sec δ , Tan δ	1.011	—0.146	1.438	+1.033	1.000	—0.008
α , α'	+2.9	+4.2	+4.4	+4.2	+3.1	+3.6
b , b'	0.00	—1.0	+0.01	—1.0	0.00	—1.0
Authority and Catalogue No.	B.J.	318	B.J.	319	N.A.	327

APPARENT PLACES OF STARS, 1931.

389

AT UPPER TRANSIT AT GREENWICH.

Name	η Orionis <i>m.</i>		γ Orionis (<i>Bellatrix</i>)		β Tauri	
Mag. Spect.	3.44	B1	1.70	B2	1.78	B8
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ^m 05 20	[°] ['] -2 27	^h ^m 05 21	[°] ['] +6 17	^h ^m 05 21	[°] ['] +28 33
Jan. 0.9	61.302 ^s	27.64 ["]	26.641 ^s	26.26 ["]	56.671 ^s	12.48 ["]
10.9	61.322 ²⁰	28.91 ¹²⁷	26.668 ²⁷	25.45 ⁸¹	56.707 ³⁶	12.94 ⁴⁶
20.9	61.297 ²⁵	30.03 ¹¹²	26.651 ¹⁷	24.74 ⁷¹	56.693 ¹⁴	13.38 ⁴⁴
30.9	61.232 ⁶⁵	30.99 ⁹⁶	26.592 ⁵⁹	24.15 ⁵⁹	56.630 ⁶³	13.78 ⁴⁰
Feb. 9.8	61.130 ¹⁰²	31.77 ⁷⁸	26.495 ⁹⁷	23.67 ⁴⁸	56.524 ¹⁰⁶	14.10 ³²
	132	58	129	37	141	23
19.8	60.998 ¹⁵⁴	32.35 ³⁸	26.366 ¹⁵⁰	23.30 ²⁵	56.383 ¹⁶⁸	14.33 ¹²
Mar. 1.8	60.844 ¹⁶⁷	32.73 ¹⁸	26.216 ¹⁶⁴	23.05 ¹⁴	56.215 ¹⁸²	14.45 ¹
11.8	60.677 ¹⁶⁹	32.91 ³	26.052 ¹⁶⁶	22.91 ³	56.033 ¹⁸⁶	14.44 ¹³
21.7	60.508 ¹⁶²	32.88 ²²	25.886 ¹⁵⁹	22.88 ⁹	55.847 ¹⁷⁶	14.31 ²⁵
31.7	60.346 ¹⁴⁴	32.66 ⁴²	25.727 ¹⁴¹	22.97 ²²	55.671 ¹⁵⁷	14.06 ³⁵
Apr. 10.7	60.202 ¹¹⁸	32.24 ⁶²	25.586 ¹¹⁴	23.19 ³³	55.514 ¹²⁵	13.71 ⁴¹
20.6	60.084 ⁸⁶	31.62 ⁸²	25.472 ⁸¹	23.52 ⁴⁷	55.389 ⁸⁷	13.30 ⁴⁵
30.6	59.998 ⁴⁸	30.80 ¹⁰¹	25.391 ⁴³	23.99 ⁶⁰	55.302 ⁴³	12.85 ⁴⁷
May 10.6	59.950 ⁷	29.79 ¹¹⁸	25.348 ¹	24.59 ⁷⁴	55.259 ⁴	12.38 ⁴⁴
20.6	59.943 ³⁷	28.61 ¹³⁴	25.347 ⁴³	25.33 ⁸⁷	55.263 ⁵⁴	11.94 ³⁹
30.5	59.980 ⁷⁹	27.27 ¹⁴⁷	25.390 ⁸⁶	26.20 ⁹⁹	55.317 ¹⁰³	11.55 ³¹
June 9.5	60.059 ¹²⁰	25.80 ¹⁵⁷	25.476 ¹²⁷	27.19 ¹⁰⁹	55.420 ¹⁴⁹	11.24 ²³
19.5	60.179 ¹⁵⁷	24.23 ¹⁶⁴	25.603 ¹⁶⁴	28.28 ¹¹⁶	55.569 ¹⁹²	11.01 ¹²
29.5	60.336 ¹⁹²	22.59 ¹⁶⁵	25.767 ²⁰⁰	29.44 ¹²⁰	55.761 ²³⁰	10.89 ²
July 9.4	60.528 ²²¹	20.94 ¹⁶³	25.967 ²²⁹	30.64 ¹²¹	55.991 ²⁶³	10.87 ⁷
19.4	60.749 ²⁴⁶	19.31 ¹⁵⁴	26.196 ²⁵³	31.85 ¹¹⁸	56.254 ²⁹¹	10.94 ¹⁷
29.4	60.995 ²⁶⁶	17.77 ¹⁴¹	26.449 ²⁷³	33.03 ¹¹¹	56.545 ³¹²	11.11 ²⁴
Aug. 8.3	61.261 ²⁸¹	16.36 ¹²³	26.722 ²⁸⁷	34.14 ⁹⁹	56.857 ³²⁸	11.35 ³⁰
18.3	61.542 ²⁹¹	15.13 ¹⁰⁰	27.009 ²⁹⁷	35.13 ⁸³	57.185 ³³⁹	11.65 ³⁴
28.3	61.833 ²⁹⁷	14.13 ⁷³	27.306 ³⁰²	35.96 ⁶³	57.524 ³⁴⁵	11.99 ³⁶
Sept. 7.3	62.130 ²⁹⁸	13.40 ⁴³	27.608 ³⁰³	36.59 ⁴²	57.869 ³⁴⁷	12.35 ³⁶
17.2	62.428 ²⁹⁶	12.97 ¹¹	27.911 ³⁰¹	37.01 ¹⁹	58.216 ³⁴⁴	12.71 ³⁵
27.2	62.724 ²⁹⁰	12.86 ²¹	28.212 ²⁹⁵	37.20 ⁴	58.560 ³³⁷	13.06 ³⁴
Oct. 7.2	63.014 ²⁷⁹	13.07 ⁵²	28.507 ²⁸⁶	37.16 ²⁹	58.897 ³²⁸	13.40 ³²
17.2	63.293 ²⁶⁶	13.59 ⁸⁰	28.793 ²⁷³	36.87 ⁴⁹	59.225 ³¹³	13.72 ³²
27.1	63.559 ²⁴⁸	14.39 ¹⁰⁵	29.066 ²⁵⁶	36.38 ⁶⁸	59.538 ²⁹⁵	14.04 ³¹
Nov. 6.1	63.807 ²²⁶	15.44 ¹²⁵	29.322 ²³³	35.70 ⁸²	59.833 ²⁷⁰	14.35 ³³
16.1	64.033 ¹⁹⁸	16.69 ¹³⁹	29.555 ²⁰⁷	34.88 ⁹²	60.103 ²⁴¹	14.68 ³⁴
26.0	64.231 ¹⁶⁷	18.08 ¹⁴⁷	29.762 ¹⁷⁵	33.96 ⁹⁸	60.344 ²⁰⁵	15.02 ³⁷
Dec. 6.0	64.398 ¹³⁰	19.55 ¹⁴⁹	29.937 ¹³⁹	32.98 ⁹⁸	60.549 ¹⁶⁴	15.39 ⁴⁰
15.9	64.528 ⁹⁰	21.04 ¹⁴⁶	30.076 ⁹⁹	32.00 ⁹⁵	60.713 ¹¹⁸	15.79 ⁴²
25.9	64.618 ⁴⁸	22.50 ¹³⁷	30.175 ⁵⁵	31.05 ⁸⁸	60.831 ⁶⁹	16.21 ⁴⁴
35.9	64.666	23.87	30.230	30.17	60.900	16.65
Mean Place	60.325	33.62	25.690	19.29	55.646	02.98
Sec δ , Tan δ	1.001	-0.043	1.006	+0.110	1.138	+0.544
a, a'	+3.0	+3.4	+3.2	+3.4	+3.8	+3.3
b, b'	0.00	-1.0	0.00	-1.0	+0.01	-1.0
Authority and Catalogue No.	A.N.	328	B.J.	330	B.J.	331

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name	β Leporis		20 G Pictoris		δ Orionis	
	2.96	Go	5.54	G5	2.48	Bo
Mag. Spect.						
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 05 ^m 25	[°] —20 ['] 48	^h 05 ^m 28	[°] —47 ['] 07	^h 05 ^m 28	[°] —0 ['] 20
Jan. 1.0	18.360 ^s	43.44 ["]	17.359 ^s	32.95 ["]	29.768 ^s	49.25 ["]
10.9	18.360 ^o	45.59 ²¹⁵	17.292 ⁶⁷	35.91 ²⁹⁶	29.796 ²⁸	50.44 ¹¹⁹
20.9	18.315 ⁴⁵	47.52 ¹⁹³	17.165 ¹²⁷	38.56 ²⁶⁵	29.780 ¹⁶	51.49 ¹⁰⁵
30.9	18.227 ⁸⁸	49.15 ¹⁶³	16.985 ¹⁸⁰	40.84 ²²⁸	29.722 ⁵⁸	52.38 ⁸⁹
Feb. 9.8	18.101 ¹²⁶	50.47 ¹³²	16.758 ²²⁷	42.67 ¹⁸³	29.626 ⁹⁶	53.10 ⁷²
19.8	17.944 ¹⁵⁷	51.46 ⁹⁹	16.494 ²⁶⁴	44.02 ¹³⁵	29.498 ¹²⁸	53.65 ⁵⁵
Mar. 1.8	17.765 ¹⁷⁹	52.09 ⁶³	16.202 ²⁹²	44.86 ⁸⁴	29.347 ¹⁵¹	54.02 ³⁷
11.8	17.573 ¹⁹²	52.35 ²⁶	15.896 ³⁰⁶	45.19 ³³	29.181 ¹⁶⁶	54.20 ¹⁸
21.7	17.378 ¹⁹⁵	52.25 ¹⁰	15.585 ³¹¹	45.00 ¹⁹	29.012 ¹⁶⁹	54.20 [—]
31.7	17.189 ¹⁸⁹	51.80 ⁴⁵	15.285 ³⁰⁰	44.31 ⁶⁹	28.850 ¹⁶²	54.02 ¹⁸
Apr. 10.7	17.018 ¹⁷¹	51.00 ⁸⁰	15.004 ²⁸¹	43.14 ¹¹⁷	28.704 ¹⁴⁶	53.67 ³⁵
20.7	16.872 ¹⁴⁶	49.87 ¹¹³	14.755 ²⁴⁹	41.50 ¹⁶⁴	28.583 ¹²¹	53.13 ⁵⁴
30.6	16.760 ¹¹²	48.42 ¹⁴⁵	14.545 ²¹⁰	39.46 ²⁰⁴	28.494 ⁸⁹	52.42 ⁷¹
May 10.6	16.685 ⁷⁵	46.70 ¹⁷²	14.382 ¹⁶³	37.04 ²⁴²	28.442 ⁵²	51.53 ⁸⁹
20.6	16.652 ³³	44.72 ¹⁹⁸	14.272 ¹¹⁰	34.31 ²⁷³	28.431 ¹¹	50.47 ¹⁰⁶
30.5	16.664 ¹²	42.54 ²¹⁸	14.218 ⁵⁴	31.33 ²⁹⁸	28.463 ³²	49.27 ¹²⁰
June 9.5	16.720 ⁵⁶	40.20 ²³⁴	14.221 ³	28.16 ³¹⁷	28.537 ⁷⁴	47.94 ¹³³
19.5	16.819 ⁹⁹	37.76 ²⁴⁴	14.282 ⁶¹	24.88 ³²⁸	28.652 ¹¹⁵	46.51 ¹⁴³
29.5	16.959 ¹⁴⁰	35.27 ²⁴⁹	14.398 ¹¹⁶	21.58 ³³⁰	28.803 ¹⁵¹	45.00 ¹⁵¹
July 9.4	17.136 ¹⁷⁷	32.80 ²⁴⁷	14.568 ¹⁷⁰	18.36 ³²²	28.991 ¹⁸⁸	43.47 ¹⁵³
19.4	17.345 ²⁰⁹	30.43 ²³⁷	14.785 ²¹⁷	15.29 ³⁰⁷	29.209 ²¹⁸	41.96 ¹⁵¹
29.4	17.584 ²³⁹	28.23 ²²⁰	15.047 ²⁶²	12.46 ²⁸³	29.451 ²⁴²	40.52 ¹⁴⁴
Aug. 8.4	17.846 ²⁶²	26.26 ¹⁹⁷	15.346 ²⁹⁹	09.98 ²⁴⁸	29.714 ²⁶³	39.19 ¹³³
18.3	18.126 ²⁸⁰	24.59 ¹⁶⁷	15.674 ³²⁸	07.90 ²⁰⁸	29.993 ²⁷⁹	38.04 ¹¹⁵
28.3	18.419 ²⁹³	23.29 ¹³⁰	16.027 ³⁵³	06.32 ¹⁵⁸	30.282 ²⁸⁹	37.09 ⁹⁵
Sept. 7.3	18.719 ³⁰⁰	22.40 ⁸⁹	16.395 ³⁶⁸	05.29 ¹⁰³	30.578 ²⁹⁶	36.40 ⁶⁹
17.2	19.024 ³⁰⁵	21.96 ⁴⁴	16.771 ³⁷⁶	04.85 ⁴⁴	30.877 ²⁹⁹	35.98 ⁴²
27.2	19.327 ³⁰³	21.99 ³	17.147 ³⁷⁶	05.03 ¹⁸	31.174 ²⁹⁷	35.86 ¹²
Oct. 7.2	19.622 ²⁹⁵	22.50 ⁵¹	17.513 ³⁶⁶	05.82 ⁷⁹	31.466 ²⁹²	36.04 ¹⁸
17.2	19.908 ²⁸⁶	23.46 ⁹⁶	17.862 ³⁴⁹	07.21 ¹³⁹	31.750 ²⁸⁴	36.52 ⁴⁸
27.1	20.177 ²⁶⁹	24.85 ¹³⁹	18.187 ³²⁵	09.16 ¹⁹⁵	32.022 ²⁷²	37.27 ⁷⁵
Nov. 6.1	20.426 ²⁴⁹	26.60 ¹⁷⁵	18.478 ²⁹¹	11.59 ²⁴³	32.276 ²⁵⁴	38.26 ⁹⁹
16.1	20.650 ²²⁴	28.66 ²⁰⁶	18.729 ²⁵¹	14.42 ²⁸³	32.510 ²³⁴	39.43 ¹¹⁷
26.1	20.843 ¹⁹³	30.94 ²²⁸	18.932 ²⁰³	17.53 ³¹¹	32.717 ²⁰⁷	40.73 ¹³⁰
Dec. 6.0	21.001 ¹⁵⁸	33.35 ²⁴¹	19.083 ¹⁵¹	20.83 ³³⁰	32.893 ¹⁷⁶	42.11 ¹³⁸
13	21.119 ¹¹⁸	35.81 ²⁴⁶	19.175 ⁹²	24.19 ³³⁶	33.032 ¹³⁹	43.51 ¹⁴⁰
15.9	21.194 ⁷⁵	38.22 ²⁴¹	19.207 ³²	27.50 ³³¹	33.131 ⁹⁹	44.87 ¹³⁶
25.9	21.223 ²⁹	40.51 ²²⁹	19.177 ³⁰	30.65 ³¹⁵	33.188 ⁵⁷	46.15 ¹²⁸
Mean Place	17.211	47.68	15.536	35.43	28.785	55.57
Sec δ , Tan δ	1.070	—0.380	1.470	—1.077	1.000	—0.006
a, a'	+2.6	+3.0	+1.6	+2.8	+3.1	+2.7
b, b'	0.00	—1.0	—0.01	—1.0	0.00	—1.0
Authority and Catalogue No.	A.N.	333	N.A.	335	B.J.	336

APPARENT PLACES OF STARS, 1931.

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AT UPPER TRANSIT AT GREENWICH.

Name	α Leporis		ϵ Orionis		ϵ Orionis	
Mag. Spect.	2.69	Fo	2.89	Oes	1.75	Bo
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 05 ^m 29	[°] —17 ['] 51	^h 05 ^m 32	[°] —5 ['] 56	^h 05 ^m 32	[°] —1 ['] 14
Jan. 1.0	42.242	68.78	04.388	67.57	43.626	34.18
10.9	42.251 ^s 9	70.82 ^s 204	04.414 ^s 26	69.06 ^s 149	43.657 ^s 31	35.43 ^s 125
20.9	42.214 ^s 37	72.65 ^s 183	04.395 ^s 19	70.39 ^s 133	43.644 ^s 13	36.54 ^s 111
30.9	42.135 ^s 79	74.22 ^s 157	04.335 ^s 60	71.53 ^s 114	43.588 ^s 56	37.48 ^s 94
Feb. 9.8	42.018 ^s 117	75.49 ^s 127	04.236 ^s 99	72.45 ^s 92	43.494 ^s 94	38.24 ^s 76
	149	95	131	69	127	58
19.8	41.869	76.44	04.105	73.14	43.367	38.82
Mar. 1.8	41.697	77.06	03.951	73.61	43.216	39.21
11.8	41.511	77.34	03.782	73.84	43.051	39.41
21.7	41.321	77.28	03.609	73.83	42.882	39.42
31.7	41.137	76.89	03.442	73.59	42.718	39.24
	167	72	152	48	148	37
Apr. 10.7	40.970	76.17	03.290	73.11	42.570	38.87
20.7	40.828	75.14	03.163	72.42	42.446	38.32
30.6	40.717	73.82	03.067	71.51	42.354	37.58
May 10.6	40.644	72.23	03.008	70.39	42.298	36.66
20.6	40.613 ^s 31	70.39 ^s 184	02.989 ^s 19	69.09 ^s 130	42.283 ^s 15	35.58 ^s 108
	12	203	23	148	27	124
30.5	40.625	68.36	03.012	67.61	42.310	34.34
June 9.5	40.680	66.16	03.078	66.00	42.380	32.98
19.5	40.777	63.85	03.185	64.28	42.490	31.51
29.5	40.914	61.49	03.330	62.50	42.637	29.96
July 9.4	41.089	59.14	03.510	60.70	42.820	28.41
	207	227	210	176	214	154
19.4	41.296	56.87	03.720	58.94	43.034	26.87
29.4	41.531	54.77	03.957	57.28	43.272	25.40
Aug. 8.4	41.789	52.88	04.214	55.76	43.532	24.06
18.3	42.065	51.26	04.489	54.45	43.808	22.88
28.3	42.354	49.99	04.775	53.40	44.096	21.92
	297	89	293	76	295	70
Sept. 7.3	42.651	49.10	05.068	52.64	44.391	21.22
17.2	42.952	48.65	05.365	52.21	44.689	20.81
27.2	43.252	48.64	05.661	52.13	44.986	20.70
Oct. 7.2	43.547	49.09	05.953	52.39	45.279	20.91
17.2	43.832	49.98	06.236	53.01	45.564	21.42
	271	130	271	94	273	79
27.1	44.103	51.28	06.507	53.95	45.837	22.21
Nov. 6.1	44.355	52.93	06.761	55.16	46.095	23.24
16.1	44.582	54.87	06.994	56.60	46.331	24.46
26.1	44.780	57.03	07.200	58.20	46.540	25.83
Dec. 6.0	44.945	59.32	07.375	59.90	46.719	27.27
	14	233	15	173	15	143
15.9	45.070	61.65	07.513†	61.63	46.862†	28.73
25.9	45.153	63.94	07.610	63.32	46.965	30.16
35.9	45.191	66.12	07.665	64.92	47.024	31.51
	83	229	97	169	103	143
	38	218	55	160	59	135
Mean Place	41.125	73.45	03.373	73.40	42.633	40.47
Sec δ , Tan δ	1.051	—0.322	1.005	—0.104	1.000	—0.022
a, a'	+2.6	+2.6	+2.9	+2.4	+3.0	+2.4
b, b'	0.00	—1.0	0.00	—1.0	0.00	—1.0
Authority and Catalogue No.	B.J.	338	B.J.	343	B.J.	344

† Second transit, Dec. 15.

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name	β Doradus		ζ Tauri		α Columbæ	
	3·8r	F5p	3·00	B3p	2·75	B5p
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 05 ^m 32	[°] -62 ['] 31	^h 05 ^m 33	[°] +21 ['] 06	^h 05 ^m 37	[°] -34 ['] 06
Jan. 1·0	64·26	62·62	32·145	16·00	10·292	31·20
10·9	64·09 17	65·80 318	32·191 46	16·02 2	10·277 15	33·91 271
20·9	63·84 25	68·64 284	32·188 3	16·08 6	10·211 66	36·34 243
30·9	63·52 32	71·08 244	32·139 49	16·15 7	10·098 113	38·44 210
Feb. 9·8	63·14 38	73·05 197	32·048 91	16·22 7	09·942 156	40·16 172
19·8	62·70 44	74·50 145	31·921 127	16·28 6	09·751 191	41·46 130
Mar. 1·8	62·22 48	75·42 92	31·767 154	16·31 3	09·534 217	42·33 87
11·8	61·73 49	75·79 37	31·597 170	16·31 3	09·301 233	42·74 41
21·7	61·23 50	75·62 17	31·422 175	16·25 6	09·063 238	42·69 5
31·7	60·74 49	74·90 72	31·254 168	16·16 9	08·832 231	42·20 49
Apr. 10·7	60·28 46	73·67 123	31·102 152	16·03 13	08·617 215	41·27 93
20·7	59·86 42	71·96 171	30·977 125	15·90 13	08·427 190	39·94 133
30·6	59·49 37	69·81 215	30·886 91	15·78 12	08·271 156	38·23 171
May 10·6	59·19 30	67·26 255	30·836 50	15·68 10	08·154 117	36·18 205
20·6	58·96 23	64·38 288	30·831 5	15·64 4	08·082 72	33·83 235
30·5	58·30 16	61·24 314	30·871 40	15·66 2	08·057 25	31·23 260
June 9·5	58·72 8	57·90 334	30·957 86	15·76 10	08·081 24	28·45 278
19·5	58·73 1	54·46 344	31·087 130	15·76 18	08·081 71	28·45 291
29·5	58·82 9	50·98 348	31·257 170	16·22 28	08·152 116	25·54 295
July 9·4	58·99 17	47·58 340	31·464 207	16·56 34	08·268 161	22·59 291
19·4	59·24 25	44·34 324	31·703 239	16·96 40	08·429 199	19·68 280
Aug. 29·4	59·55 31	41·37 297	31·969 266	17·40 44	08·628 234	16·88 261
8·4	59·92 37	38·75 262	32·256 287	17·86 46	08·862 264	14·27 232
18·3	60·35 43	36·57 218	32·560 304	18·32 46	09·126 288	11·95 196
28·3	60·82 47	34·90 167	32·876 316	18·75 43	09·414 288	09·99 153
Sept. 7·3	61·31 49	33·82 108	33·199 323	19·13 38	09·721 307	08·46 105
17·2	61·82 51	33·36 46	33·525 326	19·43 30	10·040 319	07·41 51
27·2	62·33 51	33·36 18	33·525 326	19·43 22	10·366 326	06·90 51
Oct. 7·2	62·83 50	33·54 84	33·851 321	19·65 12	10·693 327	06·94 4
17·2	63·31 48	34·38 148	34·172 321	19·77 12	11·015 322	07·54 60
27·1	63·75 44	35·86 205	34·485 313	19·81 4	11·326 311	08·70 116
Nov. 6·1	63·75 38	37·91 257	34·787 302	19·78 3	11·620 294	10·36 166
16·1	64·13 32	40·48 257	35·073 286	19·70 8	11·889 269	12·48 212
26·1	64·45 32	43·47 299	35·338 265	19·57 13	12·130 241	14·97 249
Dec. 6·0	64·69 24	46·78 331	35·575 237	19·42 15	12·336 206	17·74 277
15·9	64·85 16	50·28 350	35·780 205	19·29 13	12·500 164	20·69 295
25·9	64·92 7	53·85 357	35·947 167	19·18 11	12·619 119	23·70 301
35·9	64·90 2	57·37 352	36·071 124	19·11 7	12·688 69	26·69 299
	64·79 11	60·73 336	36·148 77	19·08 3	12·705 17	29·55 286
Mean Place	61·345	64·92	31·138	07·54	08·893	35·04
Sec δ , Tan δ	2·168	-1·924	1·072	+0·386	1·208	-0·677
a, a'	+0·5	+2·4	+3·6	+2·3	+2·2	+2·0
b, b'	-0·02	-1·0	0·00	-1·0	0·00	-1·0
Authority and Catalogue No.	B.J.	345	B.J.	346	B.J.	349

‡ Second transit, Dec. 15.

† First transit, Dec. 16.

AT UPPER TRANSIT AT GREENWICH.

Name Mag. Spect.	ζ ¹ Orionis		ι ₃₀ Tauri		κ Orionis	
	2.05	Bo	5.51	Fo	2.20	Bo
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 05 ^m 37	[°] —1 ['] 58	^h 05 ^m 43	[°] +17 ['] 42	^h 05 ^m 44	[°] —9 ['] 41
Jan. 1.0	17.533 ^s	33.00 ["]	25.680 ^s	25.22 ["]	30.028 ^s	28.43 ["]
10.9	17.567 ^s	34.30 ["]	25.734 ^s	25.03 ["]	30.061 ^s	30.16 ["]
20.9	17.556 ^s	35.46 ["]	25.740 ^s	24.89 ["]	30.048 ^s	31.71 ["]
30.9	17.503 ^s	36.45 ["]	25.699 ^s	24.80 ["]	29.992 ^s	33.05 ["]
Feb. 9.9	17.410 ^s	37.25 ["]	25.616 ^s	24.75 ["]	29.896 ^s	34.15 ["]
19.8	17.285 ^s	37.87 ["]	25.497 ^s	24.72 ["]	29.767 ^s	34.99 ["]
Mar. 1.8	17.135 ^s	38.28 ["]	25.350 ^s	24.70 ["]	29.612 ^s	35.57 ["]
11.8	16.970 ^s	38.50 ["]	25.185 ^s	24.68 ["]	29.441 ^s	35.88 ["]
21.7	16.800 ^s	38.51 ["]	25.014 ^s	24.66 ["]	29.263 ^s	35.92 ["]
31.7	16.636 ^s	38.34 ["]	24.847 ^s	24.64 ["]	29.090 ^s	35.69 ["]
Apr. 10.7	16.486 ^s	37.97 ["]	24.695 ^s	24.61 ["]	28.930 ^s	35.20 ["]
20.7	16.359 ^s	37.40 ["]	24.568 ^s	24.60 ["]	28.793 ^s	34.46 ["]
30.6	16.263 ^s	36.65 ["]	24.473 ^s	24.62 ["]	28.686 ^s	33.47 ["]
May 10.6	16.204 ^s	35.71 ["]	24.416 ^s	24.69 ["]	28.614 ^s	32.25 ["]
20.6	16.185 ^s	34.60 ["]	24.401 ^s	24.82 ["]	28.581 ^s	30.83 ["]
30.6	16.208 ^s	33.34 ["]	24.431 ^s	25.02 ["]	28.590 ^s	29.22 ["]
June 9.5	16.272 ^s	31.95 ["]	24.505 ^s	25.30 ["]	28.641 ^s	27.47 ["]
19.5	16.377 ^s	30.46 ["]	24.622 ^s	25.65 ["]	28.733 ^s	25.60 ["]
29.5	16.521 ^s	28.90 ["]	24.779 ^s	26.08 ["]	28.864 ^s	23.67 ["]
July 9.4	16.699 ^s	27.32 ["]	24.973 ^s	26.57 ["]	29.030 ^s	21.73 ["]
19.4	16.908 ^s	25.76 ["]	25.198 ^s	27.10 ["]	29.228 ^s	19.83 ["]
29.4	17.143 ^s	24.27 ["]	25.450 ^s	27.64 ["]	29.454 ^s	18.03 ["]
Aug. 8.4	17.399 ^s	22.92 ["]	25.725 ^s	28.19 ["]	29.703 ^s	16.40 ["]
18.3	17.673 ^s	21.73 ["]	26.017 ^s	28.70 ["]	29.969 ^s	14.99 ["]
28.3	17.958 ^s	20.77 ["]	26.322 ^s	29.14 ["]	30.250 ^s	13.86 ["]
Sept. 7.3	18.251 ^s	20.07 ["]	26.636 ^s	29.50 ["]	30.540 ^s	13.06 ["]
17.3	18.549 ^s	19.66 ["]	26.955 ^s	29.76 ["]	30.836 ^s	12.61 ["]
27.2	18.847 ^s	19.56 ["]	27.274 ^s	29.90 ["]	31.133 ^s	12.54 ["]
Oct. 7.2	19.141 ^s	19.78 ["]	27.591 ^s	29.91 ["]	31.428 ^s	12.86 ["]
17.2	19.428 ^s	20.32 ["]	27.902 ^s	29.80 ["]	31.716 ^s	13.56 ["]
27.1	19.703 ^s	21.14 ["]	28.203 ^s	29.59 ["]	31.993 ^s	14.62 ["]
Nov. 6.1	19.963 ^s	22.20 ["]	28.489 ^s	29.30 ["]	32.255 ^s	15.99 ["]
16.1	20.202 ^s	23.47 ["]	28.755 ^s	28.94 ["]	32.496 ^s	17.61 ["]
26.1	20.416 ^s	24.88 ["]	28.996 ^s	28.56 ["]	32.710 ^s	19.42 ["]
Dec. 6.0	20.598 ^s	26.38 ["]	29.205 ^s	28.18 ["]	32.894 ^s	21.34 ["]
16.0	20.745 ^s	27.90 ["]	29.377 ^s	27.81 ["]	33.041 ^s	23.31 ["]
25.9	20.850 ^s	29.38 ["]	29.508 ^s	27.49 ["]	33.147 ^s	25.24 ["]
35.9	20.913 ^s	30.79 ["]	29.592 ^s	27.24 ["]	33.209 ^s	27.09 ["]
Mean Place	16.529	39.30	24.669	17.21	28.973	34.25
Sec δ, Tan δ	1.001	—0.035	1.050	+0.319	1.014	—0.171
a, a'	+3.0	+2.0	+3.5	+1.4	+2.8	+1.4
b, b'	0.00	—1.0	0.00	—1.0	0.00	—1.0
Authority and Catalogue No.	N.A.	350	A.N.	354	B.J.	357

† First transit, Dec. 16.

AT UPPER TRANSIT AT GREENWICH.

Name Mag. Spect.	β Columbæ		α Orionis (<i>Betelgeuse</i>)		β Aurigæ	
	3.22	Ko	Var.	Ma	2.07	Aop
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 05 ^m 48	[°] --35 ['] 47	^h 05 ^m 51	[°] +7 ['] 23	^h 05 ^m 54	[°] +44 ['] 56
Jan. 1.0	32.963	31.32	27.101	51.66	29.370	42.28
10.9	32.956	34.14	27.157	50.84	29.446	43.69
20.9	32.896	36.70	27.166	50.12	29.457	45.06
30.9	32.787	38.92	27.129	49.53	29.404	46.34
Feb. 9.9	32.633	40.77	27.051	49.06	29.292	47.46
19.8	32.442	42.20	26.937	48.71	29.130	48.38
Mar. 1.8	32.223	43.19	26.796	48.47	28.930	49.06
11.8	31.986	43.72	26.636	48.34	28.704	49.46
21.7	31.741	43.79	26.469	48.31	28.467	49.57
31.7	31.500	43.39	26.305	48.38	28.233	49.40
Apr. 10.7	31.274	42.56	26.154	48.56	28.015	48.95
20.7	31.072	41.31	26.025	48.84	27.829	48.25
30.6	30.902	39.65	25.926	49.24	27.684	47.34
May 10.6	30.771	37.64	25.862	49.75	27.588	46.27
20.6	30.683	35.31	25.838	50.37	27.547	45.08
30.6	30.643	32.72	25.856	51.11	27.563	43.82
June 9.5	30.651	29.93	25.916	51.95	27.638	42.55
19.5	30.707	27.01	26.017	52.88	27.770	41.29
29.5	30.810	24.02	26.155	53.88	27.956	40.11
July 9.4	30.957	21.05	26.330	54.92	28.191	39.01
19.4	31.145	18.19	26.536	55.96	28.471	38.02
29.4	31.370	15.52	26.769	56.98	28.789	37.16
Aug. 8.4	31.627	13.12	27.024	57.92	29.139	36.44
18.3	31.910	11.07	27.297	58.76	29.514	35.88
28.3	32.214	09.44	27.584	59.45	29.910	35.47
Sept. 7.3	32.534	08.30	27.881	59.96	30.321	35.21
17.3	32.863	07.70	28.183	60.26	30.740	35.11
27.2	33.195	07.66	28.488	60.34	31.164	35.16
Oct. 7.2	33.524	08.20	28.791	60.20	31.586	35.37
17.2	33.844	09.29	29.090	59.83	32.002	35.73
27.1	34.149	10.91	29.380	59.25	32.406	36.25
Nov. 6.1	34.432	13.01	29.656	58.50	32.792	36.92
16.1	34.685	15.50	29.914	57.62	33.152	37.76
26.1	34.903	18.28	30.148	56.64	33.478	38.75
Dec. 6.0	35.080	21.27	30.353	55.61	33.763	39.88
16.0	35.210	24.36	30.522	54.59	33.999	41.13
25.9	35.290	27.43	30.650	53.61	34.177	42.47
35.9	35.317	30.39	30.735	52.71	34.294	43.85
Mean Place	31.524	35.78	26.097	44.52	27.953	32.66
Sec δ , Tan δ	1.233	-0.721	1.008	+0.130	1.413	+0.998
a, a'	+2.1	+1.0	+3.2	+0.7	+4.4	+0.5
b, b'	0.00	-1.0	0.00	-1.0	0.00	-1.0
Authority and Catalogue No.	A.N.	362	B.J.	365	B.J.	368

APPARENT PLACES OF STARS, 1931.

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AT UPPER TRANSIT AT GREENWICH.

Name	θ Aurigæ			ι Geminorum			ν Orionis		
Mag. Spect.	2.72	Aop		4.30	G5		4.40	B2	
Mean Solar Date	R.A.	Dec.		R.A.	Dec.		R.A.	Dec.	
	^h 05	^m 55	^s +37 12	^h 05	^m 59	^s +23 16	^h 06	^m 03	^s +14 46
Jan. 1.0	02.128	75	43.75	56.538	74	15.39	38.883	72	49.24
10.9	02.203	16	44.71	56.612	22	15.51	38.955	24	48.83
20.9	02.219		45.66	56.634	28	15.67	38.979	25	48.51
30.9	02.179	40	46.56	56.606	28	15.86	38.954	25	48.27
Feb. 9.9	02.086	93	47.37	56.532	74	16.07	38.886	68	48.11
		139	67		114	20		107	10
19.8	01.947	173	48.04	56.418		16.27	38.779	138	48.01
Mar. 1.8	01.774	197	48.53	56.273	145	16.43	38.641	158	47.96
11.8	01.577	207	48.82	56.106	167	16.54	38.483	169	47.94
21.8	01.370	203	48.91	55.930	175	16.59	38.314	168	47.96
31.7	01.167	189	48.78	55.755	163	16.57	38.146	157	48.00
			32			7			7
Apr. 10.7	00.978	161	48.46	55.592	139	16.50	37.989	135	48.07
20.7	00.817	124	47.96	55.453	109	16.38	37.854	106	48.17
30.6	00.693	81	47.31	55.344	70	16.23	37.748	70	48.31
May 10.6	00.612	31	46.55	55.274	28	16.08	37.678	31	48.51
20.6	00.581	20	45.72	55.246	16	15.93	37.647	11	48.77
			86			12			32
30.6	00.601	72	44.86	55.262	62	15.81	37.658	54	49.09
June 9.5	00.673	123	44.00	55.324	105	15.74	37.712	96	49.49
19.5	00.796	171	43.18	55.429	147	15.72	37.808	135	49.96
29.5	00.967	215	42.42	55.576	186	15.75	37.943	172	50.50
July 9.5	01.182	254	41.74	55.762	220	15.84	38.115	204	51.07
			59			14			59
19.4	01.436	289	41.15	55.982	249	15.98	38.319	233	51.66
29.4	01.725	316	40.66	56.231	273	16.15	38.552	256	52.25
Aug. 8.4	02.041	339	40.27	56.504	294	16.35	38.808	275	52.81
18.3	02.380	356	39.98	56.798	309	16.54	39.083	291	53.32
28.3	02.736	369	39.78	57.107	321	16.71	39.374	303	53.73
			11			13			30
Sept. 7.3	03.105	377	39.67	57.428	328	16.84	39.677	310	54.03
17.3	03.482	380	39.63	57.756	333	16.92	39.987	314	54.19
27.2	03.862	380	39.68	58.089	332	16.94	40.301	314	54.20
Oct. 7.2	04.242	374	39.81	58.421	329	16.88	40.615	313	54.06
17.2	04.616	364	40.02	58.750	320	16.78	40.928	305	53.77
			29			16			42
27.2	04.980	349	40.31	59.070	308	16.62	41.233	293	53.35
Nov. 6.1	05.329	326	40.69	59.378	289	16.43	41.526	277	52.82
16.1	05.655	297	41.17	59.667	266	16.23	41.803	253	52.21
26.1	05.952	260	41.76	59.933	233	16.05	42.056	225	51.56
Dec. 6.0	06.212	217	42.45	60.166	197	15.90	42.281	189	50.90
			79			9			62
16.0	06.429	167	43.24	60.363	153	15.81	42.470	148	50.28
25.9	06.596	111	44.10	60.516	106	15.79	42.618	102	49.71
35.9	06.707		45.02	60.622		15.83	42.720		49.21
			92			4			50
Mean Place	00.883	34.65		55.456	07.32		37.845	41.74	
Sec δ, Tan δ	1.256	+0.759		1.089	+0.430		1.034	+0.264	
a, a'	+4.1	+0.4		+3.6	0.0		+3.4	-0.3	
b, b'	0.00	-1.0		0.00	-1.0		0.00	-1.0	
Authority and Catalogue No.	B. J.	369		N. A.	373		B. J.	377	

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name Mag. Spect.	η Geminorum		ζ Canis Majoris		μ Geminorum	
	Var.	Ma	3.10	B ₃	3.19	Ma
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ₀₆ ^m ₁₀	[°] ₊₂₂ ['] ₃₁	^h ₀₆ ^m ₁₇	[°] ₋₃₀ ['] ₀₁	^h ₀₆ ^m ₁₈	[°] ₊₂₂ ['] ₃₃
Jan. 1.0	43 ^s .765	84 50 ^s .10	41 ^s .038	47 ^s .51	48 ^s .221	09 ^s .80
11.0	43.849	33 50.15	41.075	37 50.29	48.314	93 09.82
20.9	43.882	18 50.27	41.060	15 52.87	48.356	42 09.93
30.9	43.864	18 50.44	40.994	66 55.17	48.346	10 10.10
Feb. 9.9	43.799	65 50.63	40.881	113 57.14	48.287	59 10.30
19.8	43.692	107 50.83	40.728	153 58.73	48.186	101 10.52
Mar. 1.8	43.552	140 51.01	40.543	185 59.92	48.051	135 10.72
11.8	43.390	162 51.15	40.336	207 60.70	47.891	160 10.89
21.8	43.215	175 51.24	40.117	219 61.05	47.717	174 11.01
31.7	43.040	175 51.28	39.896	221 60.98	47.542	175 11.08
Apr. 10.7	42.875	165 51.26	39.683	213 60.50	47.376	166 11.09
20.7	42.731	144 51.19	39.489	89 59.61	47.230	146 11.05
30.7	42.618	113 51.10	39.322	127 58.34	47.112	118 10.97
May 10.6	42.540	78 50.99	39.189	133 56.72	47.029	83 10.87
20.6	42.503	37 50.88	39.094	95 54.78	46.986	43 10.77
30.6	42.510	7 50.80	39.041	53 52.57	46.986	— 10.68
June 9.5	42.561	51 50.75	39.031	10 50.13	47.030	44 10.62
19.5	42.656	95 50.75	39.066	35 47.54	47.117	87 10.59
29.5	42.792	136 50.79	39.144	78 44.84	47.246	129 10.62
July 9.5	42.966	174 50.88	39.264	120 42.12	47.413	167 10.67
19.4	43.175	209 51.01	39.423	159 39.46	47.614	201 10.76
29.4	43.414	239 51.17	39.617	194 36.92	47.846	232 10.86
Aug. 8.4	43.678	264 51.33	39.844	227 34.61	48.104	258 10.97
18.4	43.963	285 51.48	40.097	253 32.59	48.384	280 11.06
28.3	44.265	302 51.60	40.373	276 30.94	48.682	298 11.13
Sept. 7.3	44.579	314 51.68	40.668	295 29.72	48.994	312 11.14
17.3	44.903	324 51.69	40.976	308 29.00	49.316	322 11.09
27.2	45.233	330 51.62	41.293	317 28.79	49.645	329 10.96
Oct. 7.2	45.563	330 51.49	41.612	319 29.13	49.976	331 10.76
17.2	45.893	330 51.29	41.929	317 30.01	50.307	331 10.49
27.2	46.216	323 51.03	42.238	309 31.41	50.634	327 10.16
Nov. 6.1	46.528	312 50.73	42.532	294 33.27	50.951	317 09.81
16.1	46.824	296 50.42	42.804	272 35.55	51.253	302 09.45
26.1	47.096	272 50.13	43.048	244 38.14	51.532	279 09.10
Dec. 6.1	47.339	243 49.89	43.256	208 40.96	51.782	250 08.81
16.0	47.546	207 49.70	43.423	167 43.91	51.997	215 08.58
26.0	47.710	164 49.59	43.543	120 46.88	52.169	172 08.43
35.9	47.826	116 49.56	43.613	70 49.78	52.295	126 08.38
Mean Place Sec δ , Tan δ	42.669 1.083	42.36 +0.415	39.736 1.155	53.76 -0.578	47.113 1.083	02.27 +0.415
a, a'	+3.6	-0.9	+2.3	-1.5	+3.6	-1.6
b, b'	0.00	-1.0	0.00	-1.0	0.00	-1.0
Authority and Catalogue No.	B.J.	381	B.J.	389	B.J.	390

‡ Second transit, Dec. 25.

† First transit, Dec. 26.

APPARENT PLACES OF STARS, 1931.

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AT UPPER TRANSIT AT GREENWICH.

Name	β Canis Majoris		α Argus (<i>Canopus</i>)		ν Geminorum	
Mag. Spect.	1.99	B1	-0.86	Fo	4.06	B5
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ^m 06 19	[°] ['] -17 54	^h ^m 06 22	[°] ['] -52 38	^h ^m 06 24	[°] ['] +20 15
Jan. 1.0	40° 7' 18" ^s	67° 17' 228"	27° 16' 7" ^s	79° 41' 342"	53° 01' 8" ^s	34° 02' 13"
11.0	40° 77' 4" ^s	69° 45' 210"	27° 15' 16" ^s	82° 83' 319"	53° 11' 5" ^s	33° 89' 3"
20.9	40° 78' 2" ^s	71° 55' 186"	27° 06' 4" ^s	86° 02' 289"	53° 16' 1" ^s	33° 86' 3"
30.9	40° 74' 3" ^s	73° 41' 158"	26° 90' 9" ^s	88° 91' 249"	53° 15' 6" ^s	33° 89' 11"
Feb. 9.9	40° 65' 9" ^s	74° 99' 127"	26° 69' 4" ^s	91° 40' 206"	53° 10' 3" ^s	34° 00' 13"
19.9	40° 53' 6" ^s	76° 26' 95"	26° 42' 6" ^s	93° 46' 158"	53° 00' 7" ^s	34° 13' 15"
Mar. 1.8	40° 38' 2" ^s	77° 21' 61"	26° 11' 6" ^s	95° 04' 107"	52° 8' 7" ^s	34° 28' 15"
11.8	40° 20' 7" ^s	77° 82' 27"	25° 77' 8" ^s	96° 11' 55"	52° 72' 1" ^s	34° 43' 12"
21.8	40° 02' 0" ^s	78° 09' 7"	25° 42' 3" ^s	96° 66' 2"	52° 55' 2" ^s	34° 55' 8"
31.7	39° 83' 1" ^s	78° 02' 39"	25° 06' 6" ^s	96° 68' 50"	52° 38' 0" ^s	34° 63' 6"
Apr. 10.7	39° 65' 0" ^s	77° 63' 72"	24° 71' 8" ^s	96° 18' 100"	52° 21' 6" ^s	34° 69' 3"
20.7	39° 48' 6" ^s	76° 91' 102"	24° 39' 1" ^s	95° 18' 147"	52° 07' 0" ^s	34° 72' 1"
30.7	39° 34' 8" ^s	75° 89' 130"	24° 09' 7" ^s	93° 71' 190"	51° 95' 0" ^s	34° 73' 0"
May 10.6	39° 24' 2" ^s	74° 59' 156"	23° 84' 4" ^s	91° 81' 231"	51° 86' 5" ^s	34° 73' 2"
20.6	39° 17' 2" ^s	73° 03' 179"	23° 64' 0" ^s	89° 50' 264"	51° 81' 8" ^s	34° 75' 3"
30.6	39° 14' 1" ^s	71° 24' 198"	23° 49' 1" ^s	86° 86' 292"	51° 81' 2" ^s	34° 78' 6"
June 9.6	39° 15' 0" ^s	69° 26' 211"	23° 39' 9" ^s	83° 94' 312"	51° 84' 9" ^s	34° 84' 10"
19.5	39° 20' 1" ^s	67° 15' 220"	23° 36' 8" ^s	80° 82' 324"	51° 92' 9" ^s	34° 94' 13"
29.5	39° 29' 0" ^s	64° 95' 223"	23° 39' 8" ^s	77° 58' 328"	52° 04' 9" ^s	35° 07' 17"
July 9.5	39° 41' 8" ^s	62° 72' 220"	23° 48' 8" ^s	74° 30' 322"	52° 20' 7" ^s	35° 24' 19"
19.4	39° 58' 0" ^s	60° 52' 208"	23° 63' 7" ^s	71° 08' 307"	52° 39' 9" ^s	35° 43' 20"
29.4	39° 77' 4" ^s	58° 44' 191"	23° 84' 1" ^s	68° 01' 282"	52° 62' 2" ^s	35° 63' 18"
Aug. 8.4	39° 99' 6" ^s	56° 53' 167"	24° 09' 6" ^s	65° 19' 247"	52° 87' 1" ^s	35° 81' 15"
18.4	40° 24' 1" ^s	54° 86' 136"	24° 39' 5" ^s	62° 72' 205"	53° 14' 1" ^s	35° 96' 10"
28.3	40° 50' 5" ^s	53° 50' 100"	24° 73' 4" ^s	60° 67' 154"	53° 43' 1" ^s	36° 06' 3"
Sept. 7.3	40° 78' 6" ^s	52° 50' 59"	25° 10' 4" ^s	59° 13' 96"	53° 73' 5" ^s	36° 09' 6"
17.3	41° 07' 8" ^s	51° 91' 14"	25° 49' 8" ^s	58° 17' 34"	54° 05' 0" ^s	36° 03' 15"
27.3	41° 37' 8" ^s	51° 77' 32"	25° 90' 6" ^s	57° 83' 28"	54° 37' 3" ^s	35° 88' 25"
Oct. 7.2	41° 68' 1" ^s	52° 09' 77"	26° 32' 0" ^s	58° 11' 94"	54° 70' 0" ^s	35° 63' 34"
17.2	41° 98' 3" ^s	52° 86' 120"	26° 73' 0" ^s	59° 05' 155"	55° 02' 8" ^s	35° 29' 42"
27.2	42° 27' 9" ^s	54° 06' 160"	27° 12' 4" ^s	60° 60' 213"	55° 35' 2" ^s	34° 87' 47"
Nov. 6.1	42° 56' 3" ^s	55° 66' 193"	27° 49' 3" ^s	62° 73' 263"	55° 66' 7" ^s	34° 40' 50"
16.1	42° 82' 9" ^s	57° 59' 218"	27° 82' 5" ^s	65° 36' 303"	55° 96' 7" ^s	33° 90' 49"
26.1	43° 07' 1" ^s	59° 77' 237"	28° 11' 2" ^s	68° 39' 333"	56° 24' 7" ^s	33° 41' 45"
Dec. 6.1	43° 28' 3" ^s	62° 14' 246"	28° 34' 4" ^s	71° 72' 352"	56° 49' 8" ^s	32° 96' 40"
16.0	43° 45' 8" ^s	64° 60' 247"	28° 51' 4" ^s	75° 24' 358"	56° 71' 5" ^s	32° 56' 31"
26.0	43° 59' 1" ^s	67° 07' 239"	28° 61' 5" ^s	78° 82' 353"	56° 89' 0" ^s	32° 25' 21"
35.9	43° 67' 7" ^s	69° 46' 298"	28° 64' 4" ^s	82° 35' 353"	57° 01' 9" ^s	32° 04' 21"
Mean Place	39° 58' 2"	73° 67'	25° 13' 5"	85° 91'	51° 92' 0"	26° 71'
Sec δ , Tan δ	1.051	-0.323	1.649	-1.311	1.066	+0.369
a, a'	+2.6	-1.7	+1.3	-2.0	+3.6	-2.2
b, b'	0.00	-1.0	+0.01	-1.0	0.00	-1.0
Authority and Catalogue No.	B.J.	394	B.J.	396	N.A.	399

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name	γ Geminorum		ν Argus		ϵ Geminorum	
	193		318		318	
	Ao		B8		G5	
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ₀₆ ^m ₃₃	[°] ₊₁₆ ['] ₂₇	^h ₀₆ ^m ₃₅	[°] ₋₄₃ ['] ₀₇	^h ₀₆ ^m ₃₉	[°] ₊₂₅ ['] ₁₂
Jan. 09	44°594 ^s ₁₀₄	41°96 ["]	40°508 ^s ₃₂ †	56°92 ["]	42°359 ^s ₁₁₇ †	10°70 ["] ₁₅
109	44°698 ^s ₅₃	41°57 ["] ₃₉	40°540 ^s ₂₉	60°21 ["] ₃₂₉	42°476 ^s ₆₃	10°85 ["] ₂₄
209	44°751 ^s ₂	41°29 ["] ₁₇	40°511 ^s ₈₉	63°30 ["] ₂₈₁	42°539 ^s ₁₀	11°09 ["] ₃₂
309	44°753 ^s ₄₅	41°12 ["] ₈	40°422 ^s ₁₄₄	66°11 ["] ₂₄₇	42°549 ^s ₄₂	11°41 ["] ₃₆
Feb. 99	44°708 ^s ₈₈	41°04 ["] ₁	40°278 ^s ₁₉₁	68°58 ["] ₂₀₆	42°507 ^s ₈₈	11°77 ["] ₃₇
199	44°620 ^s ₁₂₃	41°03 ["] ₄	40°087 ^s ₂₃₀	70°64 ["] ₁₆₁	42°419 ^s ₁₂₆	12°14 ["] ₃₆
Mar. 18	44°497 ^s ₁₄₉	41°07 ["] ₈	39°857 ^s ₂₅₉	72°25 ["] ₁₁₄	42°293 ^s ₁₅₄	12°50 ["] ₃₁
118	44°348 ^s ₁₆₄	41°15 ["] ₁₀	39°598 ^s ₂₇₅	73°39 ["] ₆₆	42°139 ^s ₁₇₃	12°81 ["] ₂₅
218	44°184 ^s ₁₆₉	41°25 ["] ₁₀	39°323 ^s ₂₈₀	74°05 ["] ₁₆	41°966 ^s ₁₇₈	13°06 ["] ₁₆
318	44°015 ^s ₁₆₂	41°35 ["] ₁₂	39°043 ^s ₂₇₅	74°21 ["] ₃₂	41°788 ^s ₁₇₃	13°22 ["] ₇
Apr. 107	43°853 ^s ₁₄₆	41°47 ["] ₁₁	38°768 ^s ₂₅₈	73°89 ["] ₇₉	41°615 ^s ₁₅₆	13°29 ["] ₁
207	43°707 ^s ₁₂₁	41°58 ["] ₁₃	38°510 ^s ₂₃₂	73°10 ["] ₁₂₅	41°459 ^s ₁₃₁	13°28 ["] ₈
307	43°586 ^s ₉₀	41°71 ["] ₁₅	38°278 ^s ₁₉₈	71°85 ["] ₁₆₇	41°328 ^s ₉₈	13°20 ["] ₁₅
May 106	43°496 ^s ₅₂	41°86 ["] ₁₈	38°080 ^s ₁₅₇	70°18 ["] ₂₀₄	41°230 ^s ₁₈	13°05 ["] ₁₈
206	43°444 ^s ₁₃	42°04 ["] ₂₁	37°923 ^s ₁₁₂	68°14 ["] ₂₃₉	41°171 ^s ₁₈	12°87 ["] ₂₁
306	43°431 ^s ₂₈	42°25 ["] ₂₆	37°811 ^s ₆₄	65°75 ["] ₂₆₆	41°153 ^s ₂₅	12°66 ["] ₂₂
June 96	43°459 ^s ₆₉	42°51 ["] ₂₉	37°747 ^s ₁₄	63°09 ["] ₂₈₇	41°178 ^s ₆₈	12°44 ["] ₂₁
195	43°528 ^s ₁₀₈	42°80 ["] ₃₄	37°733 ^s ₃₅	60°22 ["] ₃₀₂	41°246 ^s ₁₁₀	12°23 ["] ₁₉
295	43°636 ^s ₁₄₅	43°14 ["] ₃₆	37°768 ^s ₈₆	57°20 ["] ₃₀₆	41°356 ^s ₁₅₀	12°04 ["] ₁₈
July 95	43°781 ^s ₁₈₀	43°50 ["] ₃₆	37°854 ^s ₁₃₄	54°14 ["] ₃₀₃	41°506 ^s ₁₈₅	11°86 ["] ₁₆
195	43°961 ^s ₂₀₉	43°86 ["] ₃₆	37°988 ^s ₁₇₉	51°11 ["] ₂₉₁	41°691 ^s ₂₁₇	11°70 ["] ₁₅
294	44°170 ^s ₂₃₆	44°22 ["] ₃₃	38°167 ^s ₂₂₀	48°20 ["] ₂₇₀	41°908 ^s ₂₄₆	11°55 ["] ₁₅
Aug. 84	44°406 ^s ₂₅₉	44°55 ["] ₂₇	38°387 ^s ₂₅₇	45°50 ["] ₂₃₈	42°154 ^s ₂₇₀	11°40 ["] ₁₆
184	44°665 ^s ₂₇₇	44°82 ["] ₁₈	38°644 ^s ₂₉₀	43°12 ["] ₁₉₉	42°424 ^s ₂₉₁	11°24 ["] ₁₈
283	44°942 ^s ₂₉₃	45°00 ["] ₈	38°934 ^s ₃₁₆	41°13 ["] ₁₅₃	42°715 ^s ₃₀₈	11°06 ["] ₂₂
Sept. 73	45°235 ^s ₃₀₅	45°08 ["] ₄	39°250 ^s ₃₃₈	39°60 ["] ₉₉	43°023 ^s ₃₂₂	10°84 ["] ₂₆
173	45°540 ^s ₃₁₄	45°04 ["] ₁₈	39°588 ^s ₃₅₃	38°61 ["] ₄₂	43°345 ^s ₃₃₂	10°58 ["] ₃₂
273	45°854 ^s ₃₁₉	44°86 ["] ₃₁	39°941 ^s ₃₆₀	38°19 ["] ₁₉	43°677 ^s ₃₃₇	10°26 ["] ₃₆
Oct. 72	46°173 ^s ₃₂₁	44°55 ["] ₄₅	40°301 ^s ₃₆₀	38°38 ["] ₈₁	44°014 ^s ₃₄₂	09°90 ["] ₄₀
172	46°494 ^s ₃₁₉	44°10 ["] ₅₆	40°661 ^s ₃₅₃	39°19 ["] ₁₄₁	44°356 ^s ₃₄₀	09°50 ["] ₄₃
272	46°813 ^s ₃₁₂	43°54 ["] ₆₆	41°014 ^s ₃₃₆	40°60 ["] ₁₉₆	44°696 ^s ₃₃₃	09°07 ["] ₄₃
Nov. 62	47°125 ^s ₂₉₉	42°88 ["] ₇₁	41°350 ^s ₃₁₁	42°56 ["] ₂₄₄	45°029 ^s ₃₂₁	08°64 ["] ₄₁
161	47°424 ^s ₂₈₀	42°17 ["] ₇₃	41°661 ^s ₂₇₇	45°00 ["] ₂₈₄	45°350 ^s ₃₀₁	08°23 ["] ₃₅
261	47°704 ^s ₂₅₃	41°44 ["] ₇₂	41°938 ^s ₂₃₆	47°84 ["] ₃₁₅	45°651 ^s ₂₇₄	07°88 ["] ₂₈
Dec. 61	47°957 ^s ₂₁₉	40°72 ["] ₆₆	42°174 ^s ₁₈₆	50°99 ["] ₃₃₄	45°925 ^s ₂₄₀	07°60 ["] ₁₈
160	48°176 ^s ₁₈₀	40°06 ["] ₅₈	42°360 ^s ₁₃₀	54°33 ["] ₃₄₂	46°165 ^s ₁₉₇	07°42 ["] ₇
260	48°356 ^s ₁₃₅	39°48 ["] ₄₉	42°490 ^s ₇₁	57°75 ["] ₃₃₈	46°362 ^s ₁₅₀	07°35 ["] ₅
359	48°491 ^s	38°99 ["]	42°561 ^s	61°13 ["]	46°512 ^s	07°40 ["]
Mean Place	43°515	34°93	38°914	64°25	41°198	03°79
Sec δ , Tan δ	1°043	+0°295	1°370	-0°937	1°105	+0°471
a , a'	+3°5	-2°9	+1°8	-3°1	+3°7	-3°5
b , b'	0°00	-1°0	+0°01	-1°0	-0°01	-1°0
Authority and Catalogue No.	B.J.	403	B.J.	406	B.J.	408

† Second transit, Jan. 0.

† First transit, Jan. 1.

APPARENT PLACES OF STARS, 1931.

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AT UPPER TRANSIT AT GREENWICH.

Name	ξ Geminorum		α Canis Majoris (<i>Sirius</i>)		α Pictoris	
Mag. Spect.	3.40	F5	-1.58	A0	3.30	A5
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ^m 06 41	[°] ['] +12 58	^h ^m 06 42	[°] ['] -16 36	^h ^m 06 47	[°] ['] -61 51
Jan. 1.0	^s 26.027† 108	24.33 64	^s 07.492† 76	67.99 233	^s 31.59 1	52.16 363
10.9	26.135 58	23.69 51	07.568 26	70.32 216	31.58 10	55.79 347
20.9	26.193 8	23.18 38	07.594 22	72.48 193	31.48 20	59.26 320
30.9	26.201 40	22.80 27	07.572 68	74.41 167	31.28 27	62.46 286
Feb. 9.9	26.161 82	22.53 16	07.504 108	76.08 137	31.01 34	65.32 244
19.9	26.079 118	22.37 7	07.396 143	77.45 103	30.67 40	67.76 198
Mar. 1.8	25.961 145	22.30 6	07.253 168	78.48 73	30.27 44	69.74 149
11.8	25.816 161	22.30 10	07.085 182	79.21 39	29.83 47	71.23 96
21.8	25.655 166	22.36 14	06.903 186	79.60 7	29.36 48	72.19 42
31.8	25.489 162	22.46 18	06.717 181	79.67 26	28.88 48	72.61 11
Apr. 10.7	25.327 146	22.60 18	06.536 166	79.41 56	28.40 46	72.50 64
20.7	25.181 124	22.78 23	06.370 144	78.85 86	27.94 42	71.86 115
30.7	25.057 93	23.01 27	06.226 114	77.99 113	27.52 38	70.71 163
May 10.6	24.964 58	23.28 32	06.112 82	76.86 137	27.14 33	69.08 207
20.6	24.906 37	23.60 42	06.030 43	75.49 161	26.81 27	67.01 245
30.6	24.886 20	23.97 47	05.987 4	73.88 180	26.54 20	64.56 278
June 9.6	24.906 60	24.39 52	05.983 36	72.08 194	26.34 13	61.78 304
19.5	24.966 98	24.86 53	06.019 74	70.14 203	26.21 5	58.74 323
29.5	25.064 135	25.38 53	06.093 110	68.11 207	26.16 3	55.51 332
July 9.5	25.199 163	25.91 53	06.203 147	66.04 204	26.19 10	52.19 331
19.5	25.367 198	26.44 52	06.350 178	64.00 195	26.29 18	48.88 321
29.4	25.565 224	26.96 46	06.528 207	62.05 180	26.47 25	45.67 301
Aug. 8.4	25.789 248	27.42 38	06.735 231	60.25 157	26.72 31	42.66 272
18.4	26.037 267	27.80 27	06.966 252	58.68 128	27.03 37	39.94 232
28.3	26.304 284	28.07 14	07.218 270	57.40 93	27.40 43	37.62 183
Sept. 7.3	26.588 296	28.21 2	07.488 285	56.47 54	27.83 46	35.79 128
17.3	26.884 306	28.19 18	07.773 295	55.93 12	28.29 49	34.51 67
27.3	27.190 313	28.01 36	08.068 302	55.81 34	28.78 51	33.84 2
Oct. 7.2	27.503 316	27.65 53	08.370 303	56.15 78	29.29 51	33.82 65
17.2	27.819 316	27.12 68	08.673 301	56.93 120	29.80 50	34.47 130
27.2	28.135 309	26.44 81	08.974 291	58.13 160	30.30 47	35.77 191
Nov. 6.2	28.444 297	25.63 89	09.265 278	59.73 193	30.77 43	37.68 247
16.1	28.741 279	24.74 94	09.543 255	61.66 219	31.20 37	40.15 294
26.1	29.020 254	23.80 94	09.798 228	63.85 239	31.57 30	43.09 330
Dec. 6.1	29.274 222	22.86 91	10.026 192	66.24 249	31.87 22	46.39 356
16.0	29.496 183	21.95 84	10.218 152	68.73 250	32.09 14	49.95 370
26.0	29.679 138	21.11 73	10.370 106	71.23 244	32.23 5	53.65 370
35.9	29.817 138	20.38 73	10.476 106	73.67 244	32.28 5	57.35 370
Mean Place	24.962	17.46	06.524	72.96	28.986	60.80
Sec δ , Tan δ	1.026	+0.230	1.044	-0.298	2.121	-1.870
a, a'	+3.4	-3.6	+2.7	-3.7	+0.6	-4.1
b, b'	0.00	-1.0	0.00	-1.0	+0.03	-1.0
Authority and Catalogue No.	B.J.	409	A.E.	411	B.J.	417

No. 411 corrected for a parallax of 0".37. The reductions from *c.g.* to brighter star vary during the year from -0".141, -1".98 to -0".130, -1".99. The mean place is that of *c.g.*
 † First transit, Jan. 1.

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name Mag. Spect.	τ Argus		θ Canis Majoris		ϵ Canis Majoris	
	2.83	Ko	4.25	K2	1.63	Br
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ₀₆ ^m ₄₈	[°] _{—50} ['] ₃₁	^h ₀₆ ^m ₅₀	[°] _{—11} ['] ₅₆	^h ₀₆ ^m ₅₅	[°] _{—28} ['] ₅₂
Jan. 1.0	^s ₁₅ 176	^s ₄₅ 17	^s ₆₀ 055	^s ₅₆ 12	^s ₅₅ 988	^s ₂₉ 55
10.9	^s ₁₅ 207 ³¹	^s ₄₈ 67 ³⁵⁰	^s ₆₀ 150 ⁹⁵	^s ₅₈ 23 ²¹¹	^s ₅₆ 069 ⁸¹	^s ₃₂ 46 ²⁹¹
20.9	^s ₁₅ 168 ³⁹	^s ₅₂ 01 ³³⁴	^s ₆₀ 196 ⁴⁶	^s ₆₀ 18 ¹⁹⁵	^s ₅₆ 097 ²⁸	^s ₃₅ 20 ²⁷⁴
30.9	^s ₁₅ 062 ¹⁰⁶	^s ₅₅ 08 ³⁰⁷	^s ₆₀ 192 ⁴	^s ₆₁ 92 ¹⁷⁴	^s ₅₆ 071 ²⁶	^s ₃₇ 71 ²⁵¹
Feb. 9.9	^s ₁₄ 893 ¹⁶⁹	^s ₅₇ 81 ²⁷³	^s ₆₀ 141 ⁵¹	^s ₆₃ 41 ¹⁴⁹	^s ₅₅ 995 ⁷⁶	^s ₃₉ 92 ²²¹
	^s ₂₂ 5	^s ₂₃ 3	^s ₉ 2	^s ₁₂ 3	^s ₁₂ 0	^s ₁₈ 7
19.9	^s ₁₄ 668	^s ₆₀ 14 ¹⁸⁸	^s ₆₀ 049 ¹²⁶	^s ₆₄ 64 ⁹⁶	^s ₅₅ 875 ¹⁵⁹	^s ₄₁ 79 ¹⁴⁹
Mar. 1.8	^s ₁₄ 399 ²⁶⁹	^s ₆₂ 02 ¹³⁹	^s ₅₉ 923 ¹⁵⁴	^s ₆₅ 60 ⁶⁶	^s ₅₅ 716 ¹⁸⁶	^s ₄₃ 28 ¹¹⁰
11.8	^s ₁₄ 097 ³⁰²	^s ₆₃ 41 ⁹⁰	^s ₅₉ 769 ¹⁷⁰	^s ₆₆ 26 ³⁷	^s ₅₅ 530 ²⁰⁵	^s ₄₄ 38 ⁷⁰
21.8	^s ₁₃ 772 ³²⁵	^s ₆₄ 31 ³⁷	^s ₅₉ 599 ¹⁷⁶	^s ₆₆ 63 ⁹	^s ₅₅ 325 ²¹³	^s ₄₅ 08 ²⁸
31.8	^s ₁₃ 439 ³³⁰	^s ₆₄ 68 ¹⁴	^s ₅₉ 423 ¹⁷⁴	^s ₆₆ 72 ¹⁹	^s ₅₅ 112 ²¹¹	^s ₄₅ 36 ¹³
Apr. 10.7	^s ₁₃ 109 ³¹⁵	^s ₆₄ 54 ⁶⁴	^s ₅₉ 249 ¹⁶¹	^s ₆₆ 53 ⁴⁷	^s ₅₄ 901 ¹⁹⁹	^s ₄₅ 23 ⁵³
20.7	^s ₁₂ 794 ²⁸⁹	^s ₆₃ 90 ¹¹⁴	^s ₅₉ 088 ¹⁴¹	^s ₆₆ 06 ⁷²	^s ₅₄ 702 ¹⁷⁸	^s ₄₄ 70 ⁹¹
30.7	^s ₁₂ 505 ²⁵⁴	^s ₆₂ 76 ¹⁵⁸	^s ₅₈ 947 ¹¹³	^s ₆₅ 34 ⁹⁷	^s ₅₄ 524 ¹⁵¹	^s ₄₃ 79 ¹²⁸
May 10.7	^s ₁₂ 251 ²¹³	^s ₆₁ 18 ²⁰⁰	^s ₅₈ 834 ⁸¹	^s ₆₄ 37 ¹²¹	^s ₅₄ 373 ¹¹⁹	^s ₄₂ 51 ¹⁶¹
20.6	^s ₁₂ 038 ¹⁶⁴	^s ₅₉ 18 ²³⁸	^s ₅₈ 753 ⁴⁶	^s ₆₃ 16 ¹⁴¹	^s ₅₄ 254 ⁸¹	^s ₄₀ 90 ¹⁹¹
30.6	^s ₁₁ 874 ¹¹²	^s ₅₆ 80 ²⁶⁸	^s ₅₈ 707 ⁸	^s ₆₁ 75 ¹⁵⁸	^s ₅₄ 173 ⁴¹	^s ₃₈ 99 ²¹⁶
June 9.6	^s ₁₁ 762 ⁵⁶	^s ₅₄ 12 ²⁹³	^s ₅₈ 699 ³⁰	^s ₆₀ 17 ¹⁷²	^s ₅₄ 132 [—]	^s ₃₆ 83 ²³⁶
19.5	^s ₁₁ 706 [—]	^s ₅₁ 19 ³⁰⁹	^s ₅₈ 729 ⁶⁶	^s ₅₈ 45 ¹⁸¹	^s ₅₄ 132 ⁴¹	^s ₃₄ 47 ²⁵⁰
29.5	^s ₁₁ 706 ⁵⁷	^s ₄₈ 10 ³¹⁸	^s ₅₈ 795 ¹⁰³	^s ₅₆ 64 ¹⁸⁵	^s ₅₄ 173 ⁸¹	^s ₃₁ 97 ²⁵⁷
July 9.5	^s ₁₁ 763 ¹¹³	^s ₄₄ 92 ³¹⁷	^s ₅₈ 898 ¹³⁸	^s ₅₄ 79 ¹⁸⁴	^s ₅₄ 254 ¹²¹	^s ₂₉ 40 ²⁵⁶
19.5	^s ₁₁ 876 ¹⁶⁶	^s ₄₁ 75 ³⁰⁶	^s ₅₉ 036 ¹⁶⁸	^s ₅₂ 95 ¹⁷⁸	^s ₅₄ 375 ¹⁵⁷	^s ₂₆ 84 ²⁴⁸
29.4	^s ₁₂ 042 ²¹⁷	^s ₃₈ 69 ²⁸⁷	^s ₅₉ 204 ¹⁹⁷	^s ₅₁ 17 ¹⁶⁵	^s ₅₄ 532 ¹⁹⁰	^s ₂₄ 36 ²³¹
Aug. 8.4	^s ₁₂ 259 ²⁶²	^s ₃₅ 82 ²⁵⁷	^s ₅₉ 401 ²²²	^s ₄₉ 52 ¹⁴⁵	^s ₅₄ 722 ²²¹	^s ₂₂ 05 ²⁰⁸
18.4	^s ₁₂ 521 ³⁰³	^s ₃₃ 25 ²¹⁸	^s ₅₉ 623 ²⁴⁴	^s ₄₈ 07 ¹¹⁹	^s ₅₄ 943 ²⁴⁹	^s ₁₉ 97 ¹⁷⁴
28.4	^s ₁₂ 824 ³³⁸	^s ₃₁ 07 ¹⁷²	^s ₅₉ 867 ²⁶³	^s ₄₆ 88 ⁸⁸	^s ₅₅ 192 ²⁷²	^s ₁₈ 23 ¹³⁶
Sept. 7.3	^s ₁₃ 162 ³⁶⁷	^s ₂₉ 35 ¹¹⁸	^s ₆₀ 130 ²⁷⁸	^s ₄₆ 00 ⁵³	^s ₅₅ 464 ²⁹¹	^s ₁₆ 87 ⁹⁰
17.3	^s ₁₃ 529 ³⁸⁷	^s ₂₈ 17 ⁵⁸	^s ₆₀ 408 ²⁹⁰	^s ₄₅ 47 ¹⁴	^s ₅₅ 755 ³⁰⁶	^s ₁₅ 97 ³⁹
27.3	^s ₁₃ 916 ³⁹⁹	^s ₂₇ 59 ⁵	^s ₆₀ 698 ²⁹⁹	^s ₄₅ 33 ²⁷	^s ₅₆ 061 ³¹⁷	^s ₁₅ 58 ¹³
Oct. 7.2	^s ₁₄ 315 ⁴⁰²	^s ₂₇ 64 ⁶⁹	^s ₆₀ 997 ³⁰³	^s ₄₅ 60 ⁶⁸	^s ₅₆ 378 ³²²	^s ₁₅ 71 ⁶⁷
17.2	^s ₁₄ 717 ³⁹⁵	^s ₂₈ 33 ¹³¹	^s ₆₁ 300 ³⁰³	^s ₄₆ 28 ¹⁰⁷	^s ₅₆ 700 ³²¹	^s ₁₆ 38 ¹¹⁹
27.2	^s ₁₅ 112 ³⁷⁷	^s ₂₉ 64 ¹⁹⁰	^s ₆₁ 603 ²⁹⁷	^s ₄₇ 35 ¹⁴²	^s ₅₇ 021 ³¹³	^s ₁₇ 57 ¹⁶⁹
Nov. 6.2	^s ₁₅ 489 ³⁵⁰	^s ₃₁ 54 ²⁴⁴	^s ₆₁ 900 ²⁸⁵	^s ₄₈ 77 ¹⁷⁴	^s ₅₇ 334 ²⁹⁸	^s ₁₉ 26 ²¹²
16.1	^s ₁₅ 839 ³¹¹	^s ₃₃ 98 ²⁸⁸	^s ₆₂ 185 ²⁶⁶	^s ₅₀ 51 ¹⁹⁸	^s ₅₇ 632 ²⁷⁶	^s ₂₁ 38 ²⁴⁸
26.1	^s ₁₆ 150 ²⁶⁴	^s ₃₆ 86 ³²³	^s ₆₂ 451 ²⁴⁰	^s ₅₂ 49 ²¹⁶	^s ₅₇ 908 ²⁴⁶	^s ₂₃ 86 ²⁷⁵
Dec. 6.1	^s ₁₆ 414 ²⁰⁷	^s ₄₀ 09 ³⁴⁶	^s ₆₂ 691 ²⁰⁸	^s ₅₄ 65 ²²⁴	^s ₅₈ 154 ²⁰⁸	^s ₂₆ 61 ²⁹³
16.1	^s ₁₆ 621 ¹⁴⁴	^s ₄₃ 55 ³⁵⁸	^s ₆₂ 899 ¹⁶⁹	^s ₅₆ 89 ²²⁷	^s ₅₈ 362 ¹⁶³	^s ₂₉ 54 ³⁰¹
26.0	^s ₁₆ 765 ⁷⁵	^s ₄₇ 13 ³⁵⁹	^s ₆₃ 068 ¹²⁴	^s ₅₉ 16 ²²⁰	^s ₅₈ 525 ¹¹⁴	^s ₃₂ 55 ²⁹⁹
35.9	^s ₁₆ 840	^s ₅₀ 72	^s ₆₃ 192†	^s ₆₁ 36	^s ₅₈ 639†	^s ₃₅ 54
Mean Place	13.332	53.53	58.986	63.41	54.759	37.58
Sec δ, Tan δ	1.573	—1.215	1.022	—0.212	1.142	—0.552
a, a'	+1.5	—4.2	+2.8	—4.4	+2.4	—4.8
b, b'	+0.02	—1.0	0.00	—1.0	+0.01	—1.0
Authority and Catalogue No.	A.N.	419	B.J.	422	B.J.	426

† Second transit, Dec. 35.

† First transit, Dec. 36.

APPARENT PLACES OF STARS, 1931.

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AT UPPER TRANSIT AT GREENWICH.

Name	22 Canis Majoris		ζ Geminorum		ο² Canis Majoris	
Mag. Spect.	3.68	K5	Var.	Gop	3.12	B5p
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ^m 06 58	[°] ['] -27 49	^h ^m 07 00	[°] ['] +20 40	^h ^m 07 00	[°] ['] -23 43
Jan. 1.0	^s 59.335	^s 57.91	^s 02.122	^s 29.50	^s 09.676	^s 44.89
10.9	59.420	60.78	02.256	29.30	09.768	47.60
20.9	59.452	63.50	02.338	29.22	09.807	50.14
30.9	59.431	65.99	02.367	29.26	09.795	52.47
Feb. 9.9	59.361	68.18	02.344	29.40	09.735	54.52
19.9	59.246	70.05	02.275	29.60	09.631	56.25
Mar. 1.9	59.093	71.55	02.166	29.85	09.489	57.63
11.8	58.910	72.65	02.026	30.11	09.318	58.65
21.8	58.710	73.36	01.866	30.35	09.129	59.29
31.8	58.501	73.66	01.696	30.57	08.933	59.56
Apr. 10.7	58.294	73.56	01.528	30.74	08.737	59.45
20.7	58.097	73.05	01.373	30.87	08.552	58.97
30.7	57.921	72.17	01.239	30.96	08.387	58.14
May 10.7	57.772	70.94	01.133	31.01	08.247	56.98
20.6	57.655	69.37	01.062	31.04	08.140	55.52
30.6	57.574	67.51	01.029	31.06	08.068	53.78
June 9.6	57.532	65.40	01.036	31.07	08.034	51.80
19.6	57.531	63.09	01.083	31.08	08.039	49.65
29.5	57.571	60.64	01.170	31.11	08.084	47.36
July 9.5	57.651	58.12	01.294	31.13	08.168	45.00
19.5	57.768	55.61	01.453	31.15	08.288	42.65
29.4	57.922	53.17	01.644	31.15	08.442	40.38
Aug. 8.4	58.110	50.90	01.864	31.12	08.628	38.26
18.4	58.328	48.86	02.110	31.05	08.844	36.36
28.4	58.573	47.13	02.377	30.91	09.085	34.77
Sept. 7.3	58.842	45.80	02.663	30.70	09.349	33.53
17.3	59.130	44.91	02.966	30.39	09.632	32.73
27.3	59.434	44.51	03.281	29.98	09.929	32.39
Oct. 7.3	59.749	44.63	03.605	29.48	10.236	32.54
17.2	60.069	45.28	03.937	28.89	10.551	33.19
27.2	60.389	46.46	04.271	28.22	10.865	34.34
Nov. 6.2	60.702	48.11	04.601	27.51	11.173	35.94
16.1	61.001	50.20	04.923	26.79	11.469	37.94
26.1	61.278	52.64	05.228	26.09	11.744	40.28
Dec. 6.1	61.526	55.36	05.509	25.44	11.991	42.87
16.1	61.737	58.26	05.759	24.88	12.203	45.62
26.0	61.904	61.23	05.970	24.44	12.374	48.43
36.0	62.022	64.19	06.135	24.13	12.497	51.22
Mean Place	58.126	66.04	00.996	23.21	08.524	52.89
Sec δ, Tan δ	1.131	-0.528	1.069	+0.377	1.092	-0.440
a, a'	+2.4	-5.1	+3.6	-5.2	+2.5	-5.2
b, b'	+0.01	-1.0	-0.01	-1.0	+0.01	-1.0
Authority and Catalogue No.	N.A.	427	B.J.	428	A.N.	429

AT UPPER TRANSIT AT GREENWICH.

Name-	γ Canis Majoris		δ Canis Majoris		51 Geminorum	
Mag. Spect.	4.07	B5	1.98	F8p	5.31	Mb
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 07 ^m 00	[°] —15 ['] 31	^h 07 ^m 05	[°] —26 ['] 16	^h 07 ^m 09	[°] +16 ['] 16
Jan. 1.0	6 39.220 ^s ₁₀₁	40.52 ["] ₂₃₂	7 36.251 ^s ₉₅	48.76 ["] ₂₈₃	8 25.615 ^s ₁₃₉	45.42 ["] ₅₁
10.9	39.321 ^s ₅₁	42.84 ["] ₂₁₇	36.346 ^s ₄₂	51.59 ["] ₂₆₈	25.754 ^s ₈₈	44.91 ["] ₃₇
20.9	39.372 ^s ₁	45.01 ["] ₁₉₆	36.388 ^s ₁₁	54.27 ["] ₂₄₆	25.842 ^s ₁₅	44.54 ["] ₂₄
30.9	39.373 ^s ₄₇	46.97 ["] ₁₇₀	36.377 ^s ₆₁	56.73 ["] ₂₁₈	25.878 ^s ₃₆	44.30 ["] ₁₁
Feb. 9.9	39.326 ^s ₈₉	48.67 ["] ₁₄₂	36.316 ^s ₁₀₆	58.91 ["] ₁₈₅	25.863 ^s ₆₁	44.19 ["] _—
19.9	39.237 ^s ₁₂₆	50.09 ["] ₁₁₂	36.210 ^s ₁₄₅	60.76 ["] ₁₅₀	25.802 ^s ₁₀₁	44.19 ["] ₈
Mar. 1.9	39.111 ^s ₁₅₄	51.21 ["] ₈₁	36.065 ^s ₁₇₃	62.26 ["] ₁₁₂	25.701 ^s ₁₃₂	44.27 ["] ₁₄
11.8	38.957 ^s ₁₇₂	52.02 ["] ₄₉	35.892 ^s ₁₉₄	63.38 ["] ₇₃	25.569 ^s ₁₅₂	44.41 ["] ₁₇
21.8	38.785 ^s ₁₈₀	52.51 ["] ₁₈	35.698 ^s ₂₀₃	64.11 ["] ₃₄	25.417 ^s ₁₆₄	44.58 ["] ₂₀
31.8	38.605 ^s ₁₇₉	52.69 ["] ₁₃	35.495 ^s ₂₀₃	64.45 ["] ₅	25.253 ^s ₁₆₃	44.78 ["] ₁₉
Apr. 10.7	38.426 ^s ₁₆₈	52.56 ["] ₄₄	35.292 ^s ₁₉₂	64.40 ["] ₄₄	25.090 ^s ₁₅₃	44.97 ["] ₂₀
20.7	38.258 ^s ₁₄₈	52.12 ["] ₇₃	35.100 ^s ₁₇₄	63.96 ["] ₈₁	24.937 ^s ₁₃₄	45.17 ["] ₂₀
30.7	38.110 ^s ₁₂₃	51.39 ["] ₁₀₀	34.926 ^s ₁₄₈	63.15 ["] ₁₁₅	24.803 ^s ₁₀₇	45.37 ["] ₂₀
May 10.7	37.987 ^s ₉₂	50.39 ["] ₁₂₆	34.778 ^s ₁₁₆	62.00 ["] ₁₄₈	24.696 ^s ₇₅	45.57 ["] ₂₁
20.6	37.895 ^s ₅₈	49.13 ["] ₁₄₈	34.662 ^s ₈₂	60.52 ["] ₁₇₇	24.621 ^s ₄₀	45.78 ["] ₂₁
30.6	37.837 ^s ₂₀	47.65 ["] ₁₆₈	34.580 ^s ₄₃	58.75 ["] ₂₀₂	24.581 ^s ₂	45.99 ["] ₂₃
June 9.6	37.817 ^s ₁₈	45.97 ["] ₁₈₃	34.537 ^s ₄	56.73 ["] ₂₂₂	24.579 ^s ₃₇	46.22 ["] ₂₄
19.6	37.835 ^s ₅₄	44.14 ["] ₁₉₄	34.533 ^s ₃₅	54.51 ["] ₂₃₆	24.616 ^s ₇₄	46.46 ["] ₂₅
29.5	37.889 ^s ₉₁	42.20 ["] ₁₉₉	34.568 ^s ₇₅	52.15 ["] ₂₄₄	24.690 ^s ₁₁₁	46.71 ["] ₂₆
July 9.5	37.980 ^s ₁₂₆	40.21 ["] ₁₉₉	34.643 ^s ₁₁₃	49.71 ["] ₂₄₄	24.801 ^s ₁₄₆	46.97 ["] ₂₄
19.5	38.106 ^s ₁₅₈	38.22 ["] ₁₉₂	34.756 ^s ₁₄₈	47.27 ["] ₂₃₇	24.947 ^s ₁₇₆	47.21 ["] ₂₁
29.4	38.264 ^s ₁₈₈	36.30 ["] ₁₇₉	34.904 ^s ₁₈₁	44.90 ["] ₂₂₂	25.123 ^s ₂₀₆	47.42 ["] ₁₆
Aug. 8.4	38.452 ^s ₂₁₄	34.51 ["] ₁₅₉	35.085 ^s ₂₁₂	42.68 ["] ₂₀₀	25.329 ^s ₂₃₉	47.58 ["] ₉
18.4	38.666 ^s ₂₃₈	32.92 ["] ₁₃₂	35.297 ^s ₂₃₈	40.68 ["] ₁₆₉	25.559 ^s ₂₅₃	47.67 ["] ₁
28.4	38.904 ^s ₂₅₉	31.60 ["] ₁₀₀	35.535 ^s ₂₆₃	38.99 ["] ₁₃₂	25.812 ^s ₂₇₃	47.66 ["] ₁₁
Sept. 7.3	39.163 ^s ₂₇₆	30.60 ["] ₆₂	35.798 ^s ₂₈₃	37.67 ["] ₈₈	26.085 ^s ₂₉₀	47.55 ["] ₂₅
17.3	39.439 ^s ₂₈₉	29.98 ["] ₂₁	36.081 ^s ₂₉₉	36.79 ["] ₄₁	26.375 ^s ₃₀₄	47.30 ["] ₃₉
27.3	39.728 ^s ₃₀₀	29.77 ["] ₂₂	36.380 ^s ₃₁₁	36.38 ["] ₁₀	26.679 ^s ₃₁₆	46.91 ["] ₅₄
Oct. 7.3	40.028 ^s ₃₀₆	29.99 ["] ₆₇	36.691 ^s ₃₁₈	36.48 ["] ₆₃	26.995 ^s ₃₂₃	46.37 ["] ₆₇
17.2	40.334 ^s ₃₀₇	30.66 ["] ₁₀₉	37.009 ^s ₃₁₉	37.11 ["] ₁₁₃	27.318 ^s ₃₂₆	45.70 ["] ₇₈
27.2	40.641 ^s ₃₀₂	31.75 ["] ₁₄₈	37.328 ^s ₃₁₄	38.24 ["] ₁₆₁	27.644 ^s ₃₂₅	44.92 ["] ₈₈
Nov. 6.2	40.943 ^s ₂₉₁	33.23 ["] ₁₈₂	37.642 ^s ₃₀₁	39.85 ["] ₂₀₄	27.969 ^s ₃₁₇	44.04 ["] ₉₃
16.1	41.234 ^s ₂₇₃	35.05 ["] ₂₁₀	37.943 ^s ₂₈₁	41.89 ["] ₂₃₉	28.286 ^s ₃₀₃	43.11 ["] ₉₅
26.1	41.507 ^s ₂₄₈	37.15 ["] ₂₃₁	38.224 ^s ₂₅₃	44.28 ["] ₂₆₇	28.589 ^s ₂₈₀	42.16 ["] ₉₁
Dec. 6.1	41.755 ^s ₂₁₅	39.46 ["] ₂₄₂	38.477 ^s ₂₁₈	46.95 ["] ₂₈₄	28.869 ^s ₂₅₁	41.25 ["] ₈₆
16.1	41.970 ^s ₁₇₆	41.88 ["] ₂₄₆	38.695 ^s ₁₇₅	49.79 ["] ₂₉₃	29.120 ^s ₂₁₄	40.39 ["] ₇₅
26.0	42.146 ^s ₁₃₁	44.34 ["] ₂₄₂	38.870 ^s ₁₂₇	52.72 ["] ₂₉₁	29.334 ^s ₁₆₉	39.64 ["] ₆₃
36.0	42.277 ^s	46.76 ["]	38.997 ^s	55.63 ["]	29.503 ^s	39.01 ["]
Mean Place	38.140	48.15	35.076	57.06	24.526	39.24
Sec δ , Tan δ	1.038	—0.278	1.115	—0.494	1.042	+0.292
a, a'	+2.7	—5.2	+2.4	—5.7	+3.4	—6.0
b, b'	0.00	—1.0	+0.01	—1.0	—0.01	—1.0
Authority and Catalogue No.	B.J.	430	B.J.	433	N.A.	439

APPARENT PLACES OF STARS, 1931.

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AT UPPER TRANSIT AT GREENWICH.

Name	π Argus		δ Geminorum		δ Volantis	
	2.74	K5	3.52	Fo	4.02	F5
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ₀₇ ^m ₁₄	[°] _{—36} ['] ₅₇	^h ₀₇ ^m ₁₆	[°] ₊₂₂ ['] ₀₆	^h ₀₇ ^m ₁₆	[°] _{—67} ['] ₄₉
Jan. 1.0	^s ₁₀ 43.600	71.44	^s ₁₀ 01.292	45.10	^s ₁₀ 55.30	39.98
10.9	43.693 [†] ₉₃	74.70	01.444 [†] ₁₅₂	44.93	55.32 [†] ₂	43.74
20.9	43.728 ₃₅	77.82	01.543 ₉₉	44.90 ₃	55.23 ₉	47.41
30.9	43.704 ₂₄	80.73	01.588 ₄₅	45.01 ₁₁	55.03 ₂₀	50.89
Feb. 9.9	43.626 ₇₈	83.34	01.580 ₈	45.23 ₂₂	54.73 ₃₀	54.08
19.9	43.497 ₁₂₉	85.61	01.524 ₅₆	45.52 ₂₉	54.33 ₄₀	56.92
Mar. 1.9	43.327 ₁₇₀	87.49	01.425 ₉₉	45.86 ₃₄	53.86 ₄₇	59.34
11.8	43.123 ₂₀₄	88.95	01.293 ₁₃₂	46.20 ₃₄	53.33 ₅₃	61.29
21.8	42.896 ₂₂₇	89.96	01.137 ₁₅₆	46.53 ₃₃	52.75 ₅₈	62.74
31.8	42.658 ₂₃₈	90.52	00.970 ₁₆₇	46.82 ₂₉	52.15 ₆₀	63.66
Apr. 10.8	42.417 ₂₄₁	90.63	00.800 ₁₇₀	47.06 ₂₄	51.54 ₆₁	64.05
20.7	42.186 ₂₃₁	90.29	00.641 ₁₅₉	47.23 ₁₇	50.94 ₆₀	63.90
30.7	41.972 ₂₁₄	89.51	00.501 ₁₄₀	47.34 ₁₁	50.37 ₅₇	63.23
May 10.7	41.784 ₁₈₈	88.31	00.386 ₁₁₅	47.39 ₅	49.84 ₅₃	62.04
20.6	41.627 ₁₅₇	86.73	00.305 ₈₁	47.39 _—	49.35 ₄₉	60.38
30.6	41.508 ₁₁₉	84.80	00.260 ₄₅	47.36 ₃	48.94 ₄₁	58.29
June 9.6	41.429 ₇₉	82.57	00.253 ₇	47.30 ₆	48.61 ₃₃	55.81
19.6	41.392 ₃₇	80.09	00.286 ₃₃	47.22 ₈	48.36 ₂₅	53.02
29.5	41.398 ₆	77.44	00.358 ₇₂	47.12 ₁₀	48.19 ₁₇	49.96
July 9.5	41.448 ₅₀	74.67	00.468 ₁₁₀	47.01 ₁₁	48.12 ₇	46.76
19.5	41.541 ₉₃	71.88	00.613 ₁₄₅	46.88 ₁₃	48.15 ₃	43.48
29.5	41.675 ₁₃₄	69.14	00.791 ₁₇₈	46.73 ₁₅	48.27 ₁₂	40.23
Aug. 8.4	41.848 ₁₇₃	66.55	00.999 ₂₀₈	46.55 ₁₈	48.49 ₂₂	37.11
18.4	42.058 ₂₁₀	64.20	01.233 ₂₃₄	46.31 ₂₄	48.79 ₃₀	34.22
28.4	42.300 ₂₄₂	62.16	01.491 ₂₅₈	46.01 ₃₀	49.18 ₃₉	31.67
Sept. 7.3	42.573 ₂₇₃	60.52	01.770 ₂₇₉	45.64 ₃₇	49.64 ₄₆	29.54
17.3	42.871 ₂₉₈	59.36	02.067 ₂₉₇	45.19 ₄₅	50.17 ₅₃	27.92
27.3	43.189 ₃₁₈	58.73	02.380 ₃₁₃	44.64 ₅₅	50.74 ₅₇	26.89
Oct. 7.3	43.522 ₃₃₃	58.66	02.704 ₃₂₄	44.01 ₆₃	51.35 ₆₁	26.49
17.2	43.865 ₃₄₃	59.18	03.038 ₃₃₄	43.30 ₇₁	51.97 ₆₂	26.76
27.2	44.210 ₃₄₅	60.27	03.377 ₃₃₉	42.53 ₇₇	52.59 ₆₂	27.70
Nov. 6.2	44.549 ₃₃₉	61.92	03.716 ₃₃₉	41.74 ₇₉	53.19 ₆₀	29.28
16.2	44.874 ₃₂₅	64.07	04.048 ₃₃₂	40.95 ₇₉	53.74 ₅₅	31.46
26.1	45.176 ₃₀₂	66.65	04.366 ₃₁₈	40.20 ₇₅	54.23 ₄₉	34.16
Dec. 6.1	45.446 ₂₇₀	69.56	04.662 ₂₉₆	39.52 ₆₈	54.64 ₄₁	37.31
16.1	45.676 ₂₃₀	72.71	04.929 ₂₆₇	38.95 ₅₇	54.96 ₃₂	40.78
26.0	45.858 ₁₈₂	76.00	05.157 ₂₂₈	38.51 ₄₄	55.17 ₂₁	44.47
36.0	45.987 ₁₂₉	79.32	05.340 ₁₈₃	38.22 ₂₉	55.27 ₁₀	48.25
Mean Place	42.273	80.76	00.149	39.40	52.176	51.18
Sec δ , Tan δ	1.252	—0.753	1.079	+0.406	2.650	—2.454
a, a'	+2.1	—6.4	+3.6	—6.5	0.0	—6.6
b, b'	+0.02	—0.9	—0.01	—0.9	+0.05	—0.9
Authority and Catalogue No.	B.J.	445	B.J.	447	B.J.	449

† Second transit, Jan. 10.

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name	η Canis Majoris		β Canis Minoris		σ Argus			
Mag. Spect.	2.43	B5p	3.09	B8	3.28	K5		
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.		
	^h 07	^m 21	[°] —29	['] 09	^h 07	^m 27	[°] —43	['] 09
Jan. 1.0	23.017	53.95	25.550	53.59	03.831	28.67		
11.0	23.126 [†]	56.94	25.695	52.54	03.932	32.14		
20.9	23.181	59.81	25.791	51.65	03.970	35.49		
30.9	23.182	62.47	25.836	50.92	03.945	38.66		
Feb. 9.9	23.131	64.86	25.831	50.36	03.860	41.54		
19.9	23.032	66.93	25.780	49.96	03.721	44.09		
Mar. 1.9	22.892	68.64	25.690	49.71	03.534	46.24		
11.8	22.721	69.97	25.567	49.59	03.311	47.96		
21.8	22.527	70.89	25.422	49.59	03.060	49.22		
31.8	22.320	71.41	25.265	49.69	02.794	50.01		
Apr. 10.8	22.111	71.52	25.106	49.88	02.524	50.31		
20.7	21.909	71.22	24.955	50.14	02.260	50.12		
30.7	21.724	70.53	24.820	50.48	02.012	49.47		
May 10.7	21.562	69.47	24.708	50.89	01.788	48.36		
20.6	21.428	68.06	24.625	51.35	01.596	46.84		
30.6	21.329	66.34	24.575	51.88	01.441	44.92		
June 9.6	21.267	64.34	24.560	52.46	01.327	42.68		
19.6	21.243	62.12	24.581	53.09	01.257	40.15		
29.5	21.259	59.74	24.637	53.75	01.233	37.41		
July 9.5	21.315	57.26	24.729	54.41	01.257	34.52		
19.5	21.409	54.75	24.854	55.06	01.328	31.59		
29.5	21.539	52.30	25.010	55.67	01.445	28.69		
Aug. 8.4	21.705	49.97	25.193	56.21	01.605	25.92		
18.4	21.904	47.86	25.403	56.63	01.808	23.36		
28.4	22.132	46.04	25.636	56.92	02.050	21.12		
Sept. 7.3	22.387	44.59	25.889	57.04	02.327	19.27		
17.3	22.666	43.57	26.161	56.96	02.634	17.90		
27.3	22.964	43.04	26.449	56.67	02.968	17.07		
Oct. 7.3	23.277	43.03	26.750	56.15	03.320	16.82		
17.2	23.601	43.56	27.061	55.42	03.686	17.19		
27.2	23.928	44.62	27.377	54.49	04.055	18.16		
Nov. 6.2	24.252	46.18	27.694	53.38	04.419	19.73		
16.2	24.566	48.20	28.006	52.14	04.770	21.84		
26.1	24.861	50.61	28.305	50.82	05.097	24.42		
Dec. 6.1	25.129	53.33	28.585	49.46	05.390	27.39		
16.1	25.362	56.25	28.837	48.12	05.639	30.64		
26.0	25.552	59.29	29.053	46.84	05.838	34.08		
36.0	25.695	62.36	29.227	45.69	05.978	37.58		
Mean Place	21.845	63.05	24.517	47.28	02.399	39.08		
Sec δ , Tan δ	1.145	—0.558	1.011	+0.148	1.371	—0.938		
a, a'	+2.4	—7.0	+3.3	—7.1	+1.9	—7.4		
b, b'	+0.01	—0.9	0.00	—0.9	+0.02	—0.9		
Authority and Catalogue No.	A.N.	452	B.J.	453	N.A.	457		

† First transit, Jan. 11.

APPARENT PLACES OF STARS, 1931.

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AT UPPER TRANSIT AT GREENWICH.

Name Mag. Spect.	α^2 Geminorum		Q Carinae		α Canis Minoris (<i>Procyon</i>)	
	1999	Ao	492	K5	048	F5
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ₀₇ ^m ₃₀	[°] ₊₃₂ ['] ₀₂	^h ₀₇ ^m ₃₃	[°] ₋₅₂ ['] ₂₂	^h ₀₇ ^m ₃₅	[°] ₊₅ ['] ₂₄
Jan. 10	^s _{13.250} 180	["] _{34.23} 40	^s _{59.027} 101	["] _{33.61} 368	^s _{42.475} 149	["] _{17.28} 130
110	^s _{13.430} 123	["] _{34.63} 56	^s _{59.128} 26	["] _{37.29} 360	^s _{42.624} 101	["] _{15.98} 115
209	^s _{13.553} 64	["] _{35.19} 69	^s _{59.154} 47	["] _{40.89} 343	^s _{42.725} 50	["] _{14.83} 96
309	^s _{13.617} 4	["] _{35.88} 76	^s _{59.107} 117	["] _{44.32} 316	^s _{42.775} 1	["] _{13.87} 78
Feb. 99	^s _{13.621} 49	["] _{36.64} 81	^s _{58.990} 180	["] _{47.48} 283	^s _{42.776} 47	["] _{13.09} 58
199	^s _{13.572} 97	["] _{37.45} 80	^s _{58.810} 235	["] _{50.31} 243	^s _{42.729} 87	["] _{12.51} 41
Mar. 19	^s _{13.475} 137	["] _{38.25} 73	^s _{58.575} 279	["] _{52.74} 198	^s _{42.642} 119	["] _{12.10} 25
118	^s _{13.338} 164	["] _{38.98} 63	^s _{58.296} 312	["] _{54.72} 151	^s _{42.523} 142	["] _{11.85} 9
218	^s _{13.174} 180	["] _{39.61} 50	^s _{57.984} 331	["] _{56.23} 101	^s _{42.381} 156	["] _{11.76} 3
318	^s _{12.994} 185	["] _{40.11} 34	^s _{57.653} 338	["] _{57.24} 49	^s _{42.225} 158	["] _{11.79} 14
Apr. 108	^s _{12.809} 178	["] _{40.45} 16	^s _{57.315} 335	["] _{57.73} 2	^s _{42.067} 153	["] _{11.93} 25
207	^s _{12.631} 160	["] _{40.61} 1	^s _{56.980} 319	["] _{57.71} 53	^s _{41.914} 138	["] _{12.18} 34
307	^s _{12.471} 134	["] _{40.62} 15	^s _{56.661} 293	["] _{57.18} 102	^s _{41.776} 116	["] _{12.52} 44
May 107	^s _{12.337} 102	["] _{40.47} 30	^s _{56.368} 259	["] _{56.16} 148	^s _{41.660} 89	["] _{12.96} 53
207	^s _{12.235} 63	["] _{40.17} 42	^s _{56.109} 219	["] _{54.68} 190	^s _{41.571} 58	["] _{13.49} 61
306	^s _{12.172} 22	["] _{39.75} 52	^s _{55.890} 173	["] _{52.78} 228	^s _{41.513} 23	["] _{14.10} 66
June 96	^s _{12.150} 19	["] _{39.23} 61	^s _{55.717} 122	["] _{50.50} 260	^s _{41.490} 12	["] _{14.76} 72
196	^s _{12.169} 62	["] _{38.62} 68	^s _{55.595} 67	["] _{47.90} 284	^s _{41.502} 45	["] _{15.48} 75
295	^s _{12.231} 101	["] _{37.94} 73	^s _{55.528} 12	["] _{45.06} 302	^s _{41.547} 81	["] _{16.23} 76
July 95	^s _{12.332} 142	["] _{37.21} 76	^s _{55.516} 45	["] _{42.04} 310	^s _{41.628} 114	["] _{16.99} 75
195	^s _{12.474} 177	["] _{36.45} 79	^s _{55.561} 101	["] _{38.94} 308	^s _{41.742} 144	["] _{17.74} 71
295	^s _{12.651} 211	["] _{35.66} 81	^s _{55.662} 156	["] _{35.86} 298	^s _{41.886} 171	["] _{18.45} 61
Aug. 84	^s _{12.862} 241	["] _{34.85} 82	^s _{55.818} 209	["] _{32.88} 278	^s _{42.057} 198	["] _{19.06} 49
184	^s _{13.103} 269	["] _{34.03} 84	^s _{56.027} 258	["] _{30.10} 247	^s _{42.255} 222	["] _{19.55} 34
284	^s _{13.372} 293	["] _{33.19} 86	^s _{56.285} 304	["] _{27.63} 206	^s _{42.477} 244	["] _{19.89} 15
Sept. 74	^s _{13.665} 313	["] _{32.33} 88	^s _{56.589} 344	["] _{25.57} 159	^s _{42.721} 263	["] _{20.04} 7
173	^s _{13.978} 334	["] _{31.45} 87	^s _{56.933} 376	["] _{23.98} 104	^s _{42.984} 281	["] _{19.97} 31
273	^s _{14.312} 349	["] _{30.58} 86	^s _{57.309} 401	["] _{22.94} 42	^s _{43.265} 294	["] _{19.66} 57
Oct. 73	^s _{14.661} 362	["] _{29.72} 84	^s _{57.710} 417	["] _{22.52} 21	^s _{43.559} 305	["] _{19.09} 81
172	^s _{15.023} 369	["] _{28.88} 79	^s _{58.127} 423	["] _{22.73} 87	^s _{43.864} 313	["] _{18.28} 104
272	^s _{15.392} 370	["] _{28.09} 72	^s _{58.550} 417	["] _{23.60} 149	^s _{44.177} 315	["] _{17.24} 124
Nov. 62	^s _{15.762} 366	["] _{27.37} 61	^s _{58.967} 400	["] _{25.09} 207	^s _{44.492} 309	["] _{16.00} 139
162	^s _{16.128} 352	["] _{26.76} 48	^s _{59.367} 371	["] _{27.16} 260	^s _{44.801} 299	["] _{14.61} 152
261	^s _{16.480} 331	["] _{26.28} 31	^s _{59.738} 329	["] _{29.76} 303	^s _{45.100} 280	["] _{13.09} 158
Dec. 61	^s _{16.811} 301	["] _{25.97} 13	^s _{60.067} 276	["] _{32.79} 336	^s _{45.380} 254	["] _{11.51} 157
161	^s _{17.112} 261	["] _{25.84} 6	^s _{60.343} 215	["] _{36.15} 359	^s _{45.634} 221	["] _{09.94} 152
261	^s _{17.373} 213	["] _{25.90} 26	^s _{60.558} 147	["] _{39.74} 369	^s _{45.855} 178	["] _{08.42} 141
360	^s _{17.586}	["] _{26.16}	^s _{60.705}	["] _{43.43}	^s _{46.033}	["] _{07.01}
Mean Place	11900	2821	57303	4511	41405	1108
Sec δ , Tan δ	1180	+0626	1638	-1298	1004	+0095
a, a'	+3.8	-7.7	+1.5	-8.0	+3.2	-8.1
b, b'	-0.02	-0.9	+0.03	-0.9	0.00	-0.9
Authority and Catalogue No.	A.E.	458	N.A.	463	A.E.	466

No. 458. The reductions from *c.g.* to brighter star (α^2) vary during the year from $+0^s.063$ to $+1^s.48$ to $+0^s.059$, $+1^s.45$. The mean place is that of *c.g.*

No. 466 corrected for a parallax of $0^s.31$. The reductions from *c.g.* to brighter star vary during the year from $+0^s.058$, $-0^s.08$ to $+0^s.050$, $-0^s.25$. The mean place is that of *c.g.*

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name	26 Monocerotis		β Geminorum (<i>Pollux</i>)		ξ Argus	
Mag. Spect.	4.07	Ko	1.21	Ko	3.47	Gop
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 07 ^m 37	[°] —9 ['] 23	^h 07 ^m 41	[°] +28 ['] 11	^h 07 ^m 46	[°] —24 ['] 40
Jan. 1.0	57.969 ^s	12.52 ["]	06.943 ^s	43.87 ["]	24.511 ^s	58.39 ["]
11.0	58.112 ¹⁴³	14.64 ²¹²	07.128 ¹⁸⁵	43.98 ¹¹	24.652 ¹⁴¹	61.27 ²⁸⁸
20.9	58.207 ⁹⁵	16.63 ¹⁹⁹	07.258 ¹³⁰	44.27 ²⁹	24.740 ⁸⁸	64.03 ²⁷⁶
30.9	58.251 ⁴⁴	18.42 ¹⁷⁹	07.331 ⁷³	44.71 ⁴⁴	24.775 ³⁵	66.62 ²⁵⁹
Feb. 9.9	58.246 ⁵	19.99 ¹⁵⁷	07.347 ¹⁶	45.27 ⁵⁶	24.758 ¹⁷	68.97 ²³⁵
	51 ¹³³		37 ⁶³		66 ²⁰⁶	
19.9	58.195 ⁹¹	21.32 ¹⁰⁶	07.310 ⁸⁵	45.90 ⁶⁶	24.692 ¹⁰⁸	71.03 ¹⁷³
Mar. 1.9	58.104 ¹²⁴	22.38 ⁷⁹	07.225 ¹²³	46.56 ⁶⁵	24.584 ¹⁴³	72.76 ¹³⁸
11.9	57.980 ¹⁴⁷	23.17 ⁵⁴	07.102 ¹⁵³	47.21 ⁵⁸	24.441 ¹⁶⁸	74.14 ¹⁰²
21.8	57.833 ¹⁶¹	23.71 ²⁶	06.949 ¹⁶⁹	47.79 ⁴⁹	24.273 ¹⁸⁴	75.16 ⁶⁴
31.8	57.672 ¹⁶⁵	23.97 ¹	06.780 ¹⁷⁶	48.28 ³⁹	24.089 ¹⁹¹	75.80 ²⁷
Apr. 10.8	57.507 ¹⁶⁰	23.98 ²⁴	06.604 ¹⁷¹	48.67 ²⁵	23.898 ¹⁸⁸	76.07 ¹²
20.7	57.347 ¹⁴⁸	23.74 ⁴⁸	06.433 ¹⁵⁶	48.92 ¹²	23.710 ¹⁷⁶	75.95 ⁴⁷
30.7	57.199 ¹²⁷	23.26 ⁷¹	06.277 ¹³³	49.04 ¹	23.534 ¹⁵⁶	75.48 ⁸¹
May 10.7	57.072 ¹⁰²	22.55 ⁹²	06.144 ¹⁰³	49.03 ¹²	23.378 ¹³²	74.67 ¹¹⁴
20.7	56.970 ⁷¹	21.63 ¹¹¹	06.041 ⁶⁸	48.91 ²⁴	23.246 ¹⁰²	73.53 ¹⁴⁵
30.6	56.899 ³⁹	20.52 ¹²⁷	05.973 ³⁰	48.67 ³³	23.144 ⁷⁰	72.08 ¹⁷⁰
June 9.6	56.860 ⁵	19.25 ¹⁴¹	05.943 ⁹	48.34 ⁴⁰	23.074 ³⁵	70.38 ¹⁹³
19.6	56.855 ²⁹	17.84 ¹⁵¹	05.952 ⁴⁸	47.94 ⁴⁶	23.039 ²	68.45 ²¹⁰
29.6	56.884 ⁶³	16.33 ¹⁵⁷	06.000 ⁸⁷	47.48 ⁵²	23.041 ³⁷	66.35 ²²⁰
July 9.5	56.947 ⁹⁶	14.76 ¹⁵⁸	06.087 ¹²⁵	46.96 ⁵⁷	23.078 ⁷⁴	64.15 ²²⁶
19.5	57.043 ¹²⁸	13.18 ¹⁵³	06.212 ¹⁵⁹	46.39 ⁶¹	23.152 ¹⁰⁹	61.89 ²²³
29.5	57.171 ¹⁵⁷	11.65 ¹⁴³	06.371 ¹⁹²	45.78 ⁶⁵	23.261 ¹⁴²	59.66 ²¹³
Aug. 8.4	57.328 ¹⁸⁵	10.22 ¹²⁸	06.563 ²²¹	45.13 ⁶⁹	23.403 ¹⁷⁴	57.53 ¹⁹⁵
18.4	57.513 ²¹¹	08.94 ¹⁰⁶	06.784 ²⁴⁸	44.44 ⁷⁴	23.577 ²⁰⁴	55.58 ¹⁷⁰
28.4	57.724 ²³⁴	07.88 ⁷⁹	07.032 ²⁷³	43.70 ⁷⁸	23.781 ²³³	53.88 ¹³⁷
Sept. 7.4	57.958 ²⁵⁵	07.09 ⁴⁸	07.305 ²⁹⁵	42.92 ⁸³	24.014 ²⁵⁸	52.51 ⁹⁹
17.3	58.213 ²⁷⁴	06.61 ¹²	07.600 ³¹⁵	42.09 ⁸⁸	24.272 ²⁸⁰	51.52 ⁵⁴
27.3	58.487 ²⁹⁰	06.49 ²⁵	07.915 ³³²	41.21 ⁹¹	24.552 ²⁹⁸	50.98 ⁷
Oct. 7.3	58.777 ³⁰¹	06.74 ⁶⁴	08.247 ³⁴⁶	40.30 ⁹³	24.850 ³¹³	50.91 ⁴⁵
17.3	59.078 ³⁰⁹	07.38 ¹⁰²	08.593 ³⁵⁵	39.37 ⁹²	25.163 ³²²	51.36 ⁹⁵
27.2	59.387 ³¹¹	08.40 ¹³⁶	08.948 ³⁵⁹	38.45 ⁸⁹	25.485 ³²⁵	52.31 ¹⁴²
Nov. 6.2	59.698 ³⁰⁸	09.76 ¹⁶⁷	09.307 ³⁵⁶	37.56 ⁸²	25.810 ³²⁰	53.73 ¹⁸⁷
16.2	60.006 ²⁹⁵	11.43 ¹⁹³	09.663 ³⁴⁵	36.74 ⁷¹	26.130 ³⁰⁷	55.60 ²²⁵
26.1	60.301 ²⁷⁶	13.36 ²¹⁰	10.008 ³²⁷	36.03 ⁵⁸	26.437 ²⁸⁵	57.85 ²⁵⁵
Dec. 6.1	60.577 ²⁴⁹	15.46 ²²¹	10.335 ²⁹⁹	35.45 ⁴¹	26.722 ²⁵⁵	60.40 ²⁷⁷
16.1	60.826 ²¹⁴	17.67 ²²⁵	10.634 ²⁶²	35.04 ²²	26.977 ²¹⁶	63.17 ²⁹⁰
26.1	61.040 ¹⁷²	19.92 ²²¹	10.896 ²¹⁶	34.82 ³	27.193 ¹⁷²	66.07 ²⁹²
36.0	61.212	22.13	11.112	34.79	27.365	68.99
Mean Place	56.980	20.30	05.728	39.60	23.459	67.91
Sec δ , Tan δ	1.014	—0.165	1.135	+0.536	1.101	—0.460
a , a'	+2.9	—8.3	+3.7	—8.6	+2.5	—9.0
b , b'	0.00	—0.9	—0.02	—0.9	+0.01	—0.9
Authority and Catalogue No.	A.N.	468	B.J.	470	N.A.	475

APPARENT PLACES OF STARS, 1931.

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AT UPPER TRANSIT AT GREENWICH.

Name Mag. Spect.	9 Puppis <i>m.</i>		χ Geminorum		ζ Argus	
	5.34	Go	5.04	Ko	2.27	Od
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ₀₇ ^m ₄₈	[°] ₋₁₃ ['] ₄₂	^h ₀₇ ^m ₅₉	[°] ₊₂₇ ['] ₅₉	^h ₀₈ ^m ₀₁	[°] ₋₃₉ ['] ₄₈
Jan. 1.1	35°515 ^s ₁₅₁	41°40 ["] ₂₃₈	18°138 ^s ₂₀₅	24°62 ["] ₂	10°681 ^s ₁₄₉	16°29 ["] ₃₄₃
11.0	35°666 ^s ₁₀₁	43°78 ["] ₂₂₆	18°343 ^s ₁₅₁	24°64 ["] ₂₂	10°830 ^s ₉₀	19°72 ["] ₃₃₈
21.0	35°767 ^s ₅₀	46°04 ["] ₂₀₇	18°494 ^s ₉₄	24°86 ["] ₃₉	10°920 ^s ₂₈	23°10 ["] ₃₂₄
30.9	35°817 ^s _—	48°11 ["] ₁₈₄	18°588 ^s ₃₆	25°25 ["] ₅₄	10°948 ^s ₃₂	26°34 ["] ₃₀₁
Feb. 9.9	35°817 ^s ₄₆	49°95 ["] ₁₅₉	18°624 ^s ₁₈	25°79 ["] ₆₄	10°916 ^s ₈₇	29°35 ["] ₂₇₁
19.9	35°771 ^s ₈₈	51°54 ["] ₁₃₁	18°606 ^s ₆₇	26°43 ["] ₇₀	10°829 ^s ₁₃₆	32°06 ["] ₂₃₇
Mar. 1.9	35°683 ^s ₁₂₂	52°85 ["] ₁₀₁	18°539 ^s ₁₀₉	27°13 ["] ₆₉	10°693 ^s ₁₇₈	34°43 ["] ₁₉₈
11.9	35°561 ^s ₁₄₇	53°86 ["] ₇₁	18°430 ^s ₁₄₀	27°82 ["] ₆₆	10°515 ^s ₂₀₈	36°41 ["] ₁₅₅
21.8	35°414 ^s ₁₆₂	54°57 ["] ₄₂	18°290 ^s ₁₆₀	28°48 ["] ₅₉	10°307 ^s ₂₂₉	37°96 ["] ₁₁₀
31.8	35°252 ^s ₁₆₈	54°99 ["] ₁₂	18°130 ^s ₁₇₁	29°07 ["] ₄₇	10°078 ^s ₂₄₀	39°06 ["] ₆₅
Apr. 10.8	35°084 ^s ₁₆₅	55°11 ["] ₁₆	17°959 ^s ₁₆₉	29°54 ["] ₃₅	09°838 ^s ₂₄₀	39°71 ["] ₁₈
20.8	34°919 ^s ₁₅₄	54°95 ["] ₄₄	17°790 ^s ₁₅₇	29°89 ["] ₂₂	09°598 ^s ₂₃₁	39°89 ["] ₂₇
30.7	34°765 ^s ₁₃₆	54°51 ["] ₇₀	17°633 ^s ₁₃₇	30°11 ["] ₈	09°367 ^s ₂₁₄	39°62 ["] ₇₁
May 10.7	34°629 ^s ₁₁₁	53°81 ["] ₉₄	17°496 ^s ₁₁₀	30°19 ["] ₅	09°153 ^s ₁₉₀	38°91 ["] ₁₁₃
20.7	34°518 ^s ₈₃	52°87 ["] ₁₁₇	17°386 ^s ₇₉	30°14 ["] ₁₇	08°963 ^s ₁₆₀	37°78 ["] ₁₅₃
30.6	34°435 ^s ₅₁	51°70 ["] ₁₃₆	17°307 ^s ₄₃	29°97 ["] ₂₈	08°803 ^s ₁₂₅	36°25 ["] ₁₈₈
June 9.6	34°384 ^s ₁₉	50°34 ["] ₁₅₃	17°264 ^s ₆	29°69 ["] ₃₈	08°678 ^s ₈₈	34°37 ["] ₂₁₉
19.6	34°365 ^s ₁₆	48°81 ["] ₁₆₅	17°258 ^s ₃₂	29°31 ["] ₄₆	08°590 ^s ₄₇	32°18 ["] ₂₄₅
29.6	34°381 ^s ₄₉	47°16 ["] ₁₇₂	17°290 ^s ₇₀	28°85 ["] ₅₃	08°543 ^s ₅	29°73 ["] ₂₆₂
July 9.5	34°430 ^s ₈₂	45°44 ["] ₁₇₅	17°360 ^s ₁₀₆	28°32 ["] ₆₀	08°538 ^s ₃₆	27°11 ["] ₂₇₂
19.5	34°512 ^s ₁₁₅	43°69 ["] ₁₇₁	17°466 ^s ₁₄₁	27°72 ["] ₆₆	08°574 ^s ₇₉	24°39 ["] ₂₇₄
29.5	34°627 ^s ₁₄₅	41°98 ["] ₁₆₂	17°607 ^s ₁₇₃	27°06 ["] ₇₂	08°653 ^s ₁₂₁	21°65 ["] ₂₆₇
Aug. 8.5	34°772 ^s ₁₇₄	40°36 ["] ₁₄₆	17°780 ^s ₂₀₄	26°34 ["] ₇₈	08°774 ^s ₁₆₂	18°98 ["] ₂₅₁
18.4	34°946 ^s ₂₀₂	38°90 ["] ₁₂₃	17°984 ^s ₂₃₂	25°56 ["] ₈₅	08°936 ^s ₂₀₁	16°47 ["] ₂₂₆
28.4	35°148 ^s ₂₂₆	37°67 ["] ₉₆	18°216 ^s ₂₅₈	24°71 ["] ₉₀	09°137 ^s ₂₃₈	14°21 ["] ₁₉₂
Sept. 7.4	35°374 ^s ₂₅₀	36°71 ["] ₆₂	18°474 ^s ₂₈₃	23°81 ["] ₉₆	09°375 ^s ₂₇₂	12°29 ["] ₁₄₉
17.3	35°624 ^s ₂₇₀	36°09 ["] ₂₄	18°757 ^s ₃₀₅	22°85 ["] ₁₀₂	09°647 ^s ₃₀₂	10°80 ["] ₁₀₀
27.3	35°894 ^s ₂₈₇	35°85 ["] ₁₇	19°062 ^s ₃₂₄	21°83 ["] ₁₀₆	09°949 ^s ₃₂₇	09°80 ["] ₄₆
Oct. 7.3	36°181 ^s ₃₀₂	36°02 ["] ₅₈	19°386 ^s ₃₄₁	20°77 ["] ₁₀₈	10°276 ^s ₃₄₇	09°34 ["] ₁₃
17.3	36°483 ^s ₃₁₁	36°60 ["] ₁₀₀	19°727 ^s ₃₅₄	19°69 ["] ₁₀₈	10°623 ^s ₃₆₀	09°47 ["] ₇₃
27.2	36°794 ^s ₃₁₅	37°60 ["] ₁₃₉	20°081 ^s ₃₆₁	18°61 ["] ₁₀₅	10°983 ^s ₃₆₃	10°20 ["] ₁₃₁
Nov. 6.2	37°109 ^s ₃₁₂	38°99 ["] ₁₇₅	20°442 ^s ₃₆₂	17°56 ["] ₉₈	11°346 ^s ₃₅₈	11°51 ["] ₁₈₆
16.2	37°421 ^s ₃₀₁	40°74 ["] ₂₀₃	20°804 ^s ₃₅₅	16°58 ["] ₈₈	11°704 ^s ₃₄₃	13°37 ["] ₂₃₆
26.2	37°722 ^s ₂₈₃	42°77 ["] ₂₂₆	21°159 ^s ₃₃₈	15°70 ["] ₇₃	12°047 ^s ₃₁₈	15°73 ["] ₂₇₇
Dec. 6.1	38°005 ^s ₂₅₆	45°03 ["] ₂₄₁	21°497 ^s ₃₁₃	14°97 ["] ₅₅	12°365 ^s ₂₈₃	18°50 ["] ₃₁₀
16.1	38°261 ^s ₂₂₁	47°44 ["] ₂₄₆	21°810 ^s ₂₇₉	14°42 ["] ₃₅	12°648 ^s ₂₃₈	21°60 ["] ₃₃₂
26.1	38°482 ^s ₁₈₀	49°90 ["] ₂₄₆	22°089 ^s ₂₃₆	14°07 ["] ₁₄	12°886 ^s ₁₈₆	24°92 ["] ₃₄₃
36.0	38°662 ^s _—	52°36 ["] _—	22°325 ^s _—	13°93 ["] _—	13°072 ^s _—	28°35 ["] _—
Mean Place	34°538	49°74	16°942	21°21.	09°478	28°04
Sec δ, Tan δ	1°029	-0°244	1°132	+0°531	1°302	-0°833
<i>a, a'</i>	+2.8	-9.1	+3.7	-10.0	+2.1	-10.1
<i>b, b'</i>	+0.01	-0.9	-0.02	-0.9.	+0.03	-0.9
Authority and Catalogue No.	A.N.	478	B.J.	489	B.J.	492

§ Transit, Jan. 20.

† First transit, Jan. 21.

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name	ρ Argus		γ Argus		20 Puppis	
Mag. Spect.	2.88	F5	1.92	Oap	5.05	G5
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ^m 08 04	[°] ['] -24 06	^h ^m 08 07	[°] ['] -47 07	^h ^m 08 10	[°] ['] -15 34
Jan. 1.1	37.242 ^s 160	05.57 ["] 289	25.622 ^s 156	43.89 ["] 362	10.532 ^s 171	36.13 ["] 252
11.0	37.402 109	08.46 280	25.778 89	47.51 359	10.703 122	38.65 241
21.0	37.511 ²² 56	11.26 263	25.867 22	51.10 327	10.825 71	41.06 223
30.9	37.567 3	13.89 240	25.889 44	54.57 298	10.896 19	43.29 202
Feb. 9.9	37.570 47	16.29 213	25.845 106	57.84 263	10.915 29	45.31 176
19.9	37.523 91	18.42 182	25.739 161	60.82 223	10.886 72	47.07 147
Mar. 1.9	37.432 128	20.24 148	25.578 206	63.45 223	10.814 108	48.54 118
11.9	37.304 156	21.72 112	25.372 242	65.68 180	10.706 137	49.72 87
21.8	37.148 174	22.84 76	25.130 266	67.48 133	10.569 155	50.59 56
31.8	36.974 184	23.60 39	24.864 280	68.81 84	10.414 165	51.15 26
Apr. 10.8	36.790 183	23.99 3	24.584 282	69.65 36	10.249 165	51.41 3
20.8	36.607 175	24.02 33	24.302 275	70.01 13	10.084 157	51.38 33
30.7	36.432 158	23.69 67	24.027 258	69.88 61	09.927 142	51.05 60
May 10.7	36.274 137	23.02 100	23.769 234	69.27 108	09.785 121	50.45 87
20.7	36.137 110	22.02 130	23.535 202	68.19 150	09.664 96	49.58 110
30.7	36.027 80	20.72 156	23.333 166	66.69 190	09.568 67	48.48 131
June 9.6	35.947 47	19.16 180	23.167 125	64.79 224	09.501 36	47.17 150
19.6	35.900 14	17.36 198	23.042 83	62.55 254	09.465 5	45.67 105
29.6	35.886 22	15.38 210	22.959 35	60.01 273	09.460 29	44.02 173
July 9.5	35.908 57	13.28 216	22.924 13	57.28 287	09.489 61	42.29 177
19.5	35.965 91	11.12 217	22.937 62	54.41 292	09.550 93	40.52 175
29.5	36.056 124	08.95 208	22.999 111	51.49 287	09.643 124	38.77 168
Aug. 8.5	36.180 157	06.87 192	23.110 158	48.62 273	09.767 154	37.09 153
18.4	36.337 188	04.95 170	23.268 204	45.89 248	09.921 183	35.56 133
28.4	36.525 217	03.25 140	23.472 248	43.41 215	10.104 210	34.23 105
Sept. 7.4	36.742 244	01.85 102	23.720 289	41.26 172	10.314 236	33.18 72
17.4	36.986 270	00.83 59	24.009 325	39.54 121	10.550 259	32.46 34
27.3	37.256 291	00.24 13	24.334 354	38.33 65	10.809 281	32.12 7
Oct. 7.3	37.547 308	00.11 37	24.688 378	37.68 4	11.090 298	32.19 50
17.3	37.855 321	00.48 86	25.066 392	37.64 58	11.388 311	32.69 93
27.2	38.176 327	01.34 135	25.458 397	38.22 120	11.699 319	33.62 135
Nov. 6.2	38.503 325	02.69 180	25.855 391	39.42 180	12.018 320	34.97 172
16.2	38.828 316	04.49 218	26.246 374	41.22 234	12.338 312	36.69 204
26.2	39.144 298	06.67 250	26.620 345	43.56 280	12.650 297	38.73 230
Dec. 6.1	39.442 270	09.17 273	26.965 306	46.36 317	12.947 273	41.03 247
16.1	39.712 235	11.90 288	27.271 255	49.53 344	13.220 240	43.50 256
26.1	39.947 191	14.78 292	27.526 196	52.97 359	13.460 200	46.06 257
36.1	40.138	17.70	27.722	56.56	13.660	48.63
Mean Place	36.254	15.48	24.279	56.76	09.607	44.95
Sec δ , Tan δ	1.096	-0.447	1.470	-1.077	1.038	-0.279
a, a'	+2.6	-10.4	+1.9	-10.6	+2.8	-10.8
b, b'	+0.02	-0.9	+0.04	-0.8	+0.01	-0.8
Authority and Catalogue No.	B.J.	495	B.J.	498	B.J.	500

APPARENT PLACES OF STARS, 1931.

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AT UPPER TRANSIT AT GREENWICH.

Name Mag. Spect.	β Cancr		δ^1 Cancr		ϵ Argus	
	3.76	K2	5.88	Fo	1.74	Ko-B
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 08 ^m 12	[°] +9 ['] 23	^h 08 ^m 19	[°] +18 ['] 33	^h 08 ^m 21	[°] -59 ['] 16
Jan. 1.1	47.398 ^s ₁₉₃	63.32 ["] ₁₁₈	25.910 ^s ₂₁₀	21.89 ["] ₆₅	07.649 ^s ₁₈₄	58.01 ["] ₃₇₈
11.0	47.591 ^s ₁₄₅	62.14 ["] ₉₉	26.120 ^s ₁₆₀	21.24 ["] ₄₅	07.833 ^s ₉₈	61.79 ["] ₃₈₂
21.0	47.736 ^s ₉₄	61.15 ["] ₈₀	26.280 ^s ₁₀₈	20.79 ["] ₂₄	07.931 ^s ₁₁	65.61 ["] ₃₇₅
30.9	47.830 ^s ₄₃	60.35 ["] ₆₁	26.388 ^s ₅₃	20.55 ["] ₆	07.942 ^s ₇₄	69.36 ["] ₃₆₀
Feb. 9.9	47.873 ^s ₇	59.74 ["] ₄₁	26.441 ^s ₂	20.49 ["] ₁₁	07.868 ^s ₁₅₃	72.96 ["] ₃₃₄
19.9	47.866 ^s ₅₂	59.33 ["] ₂₄	26.443 ^s ₄₅	20.60 ["] ₂₄	07.715 ^s ₂₂₄	76.30 ["] ₃₀₃
Mar. 1.9	47.814 ^s ₈₉	59.09 ["] ₈	26.398 ^s ₈₆	20.84 ["] ₃₄	07.491 ^s ₂₈₄	79.33 ["] ₂₆₄
11.9	47.725 ^s ₁₁₉	59.01 ["] ₄	26.312 ^s ₁₁₇	21.18 ["] ₃₉	07.207 ^s ₃₃₃	81.97 ["] ₂₂₁
21.9	47.606 ^s ₁₃₈	59.05 ["] ₁₅	26.195 ^s ₁₄₀	21.57 ["] ₄₂	06.874 ^s ₃₆₈	84.18 ["] ₁₇₃
31.8	47.468 ^s ₁₄₉	59.20 ["] ₂₃	26.055 ^s ₁₅₀	21.99 ["] ₄₁	06.506 ^s ₃₉₀	85.91 ["] ₁₂₃
Apr. 10.8	47.319 ^s ₁₄₉	59.43 ["] ₃₀	25.905 ^s ₁₅₄	22.40 ["] ₄₀	06.116 ^s ₄₀₀	87.14 ["] ₇₂
20.8	47.170 ^s ₁₄₀	59.73 ["] ₃₅	25.751 ^s ₁₄₅	22.80 ["] ₃₅	05.716 ^s ₃₉₆	87.86 ["] ₁₉
30.7	47.030 ^s ₁₂₅	60.08 ["] ₄₀	25.606 ^s ₁₃₀	23.15 ["] ₃₀	05.320 ^s ₃₈₂	88.05 ["] ₃₃
May 10.7	46.905 ^s ₁₀₃	60.48 ["] ₄₃	25.476 ^s ₁₀₉	23.45 ["] ₂₅	04.938 ^s ₃₅₇	87.72 ["] ₈₄
20.7	46.802 ^s ₇₇	60.91 ["] ₄₆	25.367 ^s ₈₂	23.70 ["] ₂₀	04.581 ^s ₃₂₂	86.88 ["] ₁₃₂
30.7	46.725 ^s ₄₇	61.37 ["] ₄₈	25.285 ^s ₅₂	23.90 ["] ₁₄	04.259 ^s ₂₈₁	85.56 ["] ₁₇₈
June 9.6	46.678 ^s ₁₇	61.85 ["] ₅₀	25.233 ^s ₂₀	24.04 ["] ₉	03.978 ^s ₂₃₁	83.78 ["] ₂₁₇
19.6	46.661 ^s ₁₅	62.35 ["] ₅₁	25.213 ^s ₁₃	24.13 ["] ₃	03.747 ^s ₁₇₇	81.61 ["] ₂₅₂
29.6	46.676 ^s ₄₈	62.86 ["] ₄₉	25.226 ^s ₄₆	24.16 ["] ₃	03.570 ^s ₁₁₆	79.09 ["] ₂₇₉
July 9.6	46.724 ^s ₈₀	63.35 ["] ₄₅	25.272 ^s ₇₉	24.13 ["] ₉	03.454 ^s ₅₃	76.30 ["] ₂₉₈
19.5	46.804 ^s ₁₁₀	63.80 ["] ₃₉	25.351 ^s ₁₁₀	24.04 ["] ₁₆	03.401 ^s ₁₃	73.32 ["] ₃₀₉
29.5	46.914 ^s ₁₄₀	64.19 ["] ₃₁	25.461 ^s ₁₄₂	23.88 ["] ₂₅	03.414 ^s ₈₁	70.23 ["] ₃₀₉
Aug. 8.5	47.054 ^s ₁₆₇	64.50 ["] ₂₀	25.603 ^s ₁₇₀	23.63 ["] ₃₅	03.495 ^s ₁₄₈	67.14 ["] ₂₉₈
18.4	47.221 ^s ₁₉₃	64.70 ["] ₆	25.773 ^s ₁₉₇	23.28 ["] ₄₅	03.643 ^s ₂₁₅	64.16 ["] ₂₇₉
28.4	47.414 ^s ₂₁₉	64.76 ["] ₁₁	25.970 ^s ₂₂₄	22.83 ["] ₅₉	03.858 ^s ₂₇₈	61.37 ["] ₂₄₈
Sept. 7.4	47.633 ^s ₂₄₂	64.65 ["] ₃₀	26.194 ^s ₂₄₉	22.24 ["] ₇₂	04.136 ^s ₃₃₇	58.89 ["] ₂₀₇
17.4	47.875 ^s ₂₆₄	64.35 ["] ₅₁	26.443 ^s ₂₇₃	21.52 ["] ₈₅	04.473 ^s ₃₈₉	56.82 ["] ₁₅₇
27.3	48.139 ^s ₂₈₅	63.84 ["] ₇₃	26.716 ^s ₂₉₃	20.67 ["] ₉₉	04.862 ^s ₄₃₄	55.25 ["] ₁₀₁
Oct. 7.3	48.424 ^s ₃₀₁	63.11 ["] ₉₃	27.009 ^s ₃₁₃	19.68 ["] ₁₁₁	05.206 ^s ₄₆₈	54.24 ["] ₃₈
17.3	48.725 ^s ₃₁₆	62.18 ["] ₁₁₃	27.322 ^s ₃₂₈	18.57 ["] ₁₂₂	05.764 ^s ₄₈₉	53.86 ["] ₂₇
27.3	49.041 ^s ₃₂₅	61.05 ["] ₁₃₀	27.650 ^s ₃₃₈	17.35 ["] ₁₂₉	06.253 ^s ₄₉₈	54.13 ["] ₉₃
Nov. 6.2	49.366 ^s ₃₂₇	59.75 ["] ₁₄₃	27.988 ^s ₃₄₂	16.06 ["] ₁₃₂	06.751 ^s ₄₉₁	55.06 ["] ₁₅₇
16.2	49.693 ^s ₃₂₃	58.32 ["] ₁₅₁	28.330 ^s ₃₄₀	14.74 ["] ₁₃₀	07.242 ^s ₄₆₈	56.63 ["] ₂₁₈
26.2	50.016 ^s ₃₁₀	56.81 ["] ₁₅₄	28.670 ^s ₃₂₇	13.44 ["] ₁₂₄	07.710 ^s ₄₃₀	58.81 ["] ₂₇₀
Dec. 6.1	50.326 ^s ₂₈₉	55.27 ["] ₁₅₁	28.997 ^s ₃₀₆	12.20 ["] ₁₁₃	08.140 ^s ₃₇₇	61.51 ["] ₃₁₄
16.1	50.615 ^s ₂₅₉	53.76 ["] ₁₄₂	29.303 ^s ₂₇₇	11.07 ["] ₉₈	08.517 ^s ₃₁₂	64.65 ["] ₃₄₈
26.1	50.874 ^s ₂₂₁	52.34 ["] ₁₃₀	29.580 ^s ₂₃₇	10.09 ["] ₈₁	08.829 ^s ₂₃₆	68.13 ["] ₃₇₂
36.1	51.095 ^s	51.04 ["]	29.817 ^s	09.28 ["]	09.065 ^s	71.85 ["]
Mean Place	46.433	58.14	24.875	18.21	05.914	72.91
Sec δ , Tan δ	1.014	+0.166	1.055	+0.336	1.958	-1.683
a, a'	+3.3	-11.0	+3.4	-11.5	+1.2	-11.6
b, b'	-0.01	-0.8	-0.01	-0.8	+0.06	-0.8
Authority and Catalogue No.	B.J.	503	N.A.	507	B.J.	508

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name	30 Monocerotis		α Ursæ Majoris		η Cancri	
	3·95	Ao	3·47	Go	5·52	Ko
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 08 ^m 22	[°] —3 ['] 40	^h 08 ^m 24	[°] +60 ['] 56	^h 08 ^m 28	[°] +20 ['] 40
Jan. 1·1	13 ^s ·636	41 ["] ·92	35 ^s ·35	61 ["] ·23	44 ^s ·261	39 ["] ·57
11·0	13 ^s ·826 ¹⁹⁰	43 ["] ·86 ¹⁹⁴	35 ^s ·71 ³⁶	62 ["] ·94 ¹⁷¹	44 ^s ·483 ²²²	39 ["] ·00 ⁵⁷
21·0	13 ^s ·969 ¹⁴³	45 ["] ·66 ¹⁸⁰	35 ^s ·98 ²⁷	64 ["] ·93 ¹⁹⁹	44 ^s ·656 ¹⁷³	38 ["] ·65 ³⁵
30·9	14 ^s ·062 ²⁷ 93	47 ["] ·28 ¹⁶²	36 ^s ·15 ¹⁷	67 ["] ·12 ²¹⁹	44 ^s ·775 ²⁸ 119	38 ["] ·51 ¹⁴
Feb. 9·9	14 ^s ·105 ⁴³	48 ["] ·68 ¹⁴⁰	36 ^s ·22 ⁷	69 ["] ·41 ²²⁹	44 ^s ·839 ⁶⁴	38 ["] ·57 ⁶
	⁶	¹¹⁷	²	²²⁹	¹²	²³
19·9	14 ^s ·099 ⁵⁰	49 ["] ·85 ⁹⁴	36 ^s ·20 ¹¹	71 ["] ·70 ²²⁰	44 ^s ·851 ³⁷	38 ["] ·80 ³⁶
Mar. 1·9	14 ^s ·049 ⁸⁷	50 ["] ·79 ⁷⁰	36 ^s ·09 ²⁰	73 ["] ·90 ²⁰¹	44 ^s ·814 ⁸⁰	39 ["] ·16 ⁴⁵
11·9	13 ^s ·962 ¹¹⁷	51 ["] ·49 ⁴⁷	35 ^s ·89 ²⁶	75 ["] ·91 ¹⁷³	44 ^s ·734 ¹¹²	39 ["] ·61 ⁵⁰
21·9	13 ^s ·845 ¹³⁶	51 ["] ·96 ²⁵	35 ^s ·63 ³⁰	77 ["] ·64 ¹³⁹	44 ^s ·622 ¹³⁶	40 ["] ·11 ⁵¹
31·8	13 ^s ·709 ¹⁴⁸	52 ["] ·21 ⁵	35 ^s ·33 ³³	79 ["] ·03 ¹⁰⁰	44 ^s ·486 ¹⁵¹	40 ["] ·62 ⁴⁹
Apr. 10·8	13 ^s ·561 ¹⁵⁰	52 ["] ·26 ¹⁴	35 ^s ·00 ³⁵	80 ["] ·03 ⁵⁷	44 ^s ·335 ¹⁵⁴	41 ["] ·11 ⁴⁴
20·8	13 ^s ·411 ¹⁴³	52 ["] ·12 ³³	34 ^s ·65 ³⁴	80 ["] ·60 ¹³	44 ^s ·181 ¹⁴⁷	41 ["] ·55 ³⁸
30·7	13 ^s ·268 ¹³⁰	51 ["] ·79 ⁴⁹	34 ^s ·31 ³¹	80 ["] ·73 ³¹	44 ^s ·034 ¹³⁴	41 ["] ·93 ³⁰
May 10·7	13 ^s ·138 ¹¹⁰	51 ["] ·30 ⁶⁵	34 ^s ·00 ²⁸	80 ["] ·42 ⁷³	43 ^s ·900 ¹¹³	42 ["] ·23 ²³
20·7	13 ^s ·028 ⁸⁶	50 ["] ·65 ⁷⁹	33 ^s ·72 ²³	79 ["] ·69 ¹¹³	43 ^s ·787 ⁸⁸	42 ["] ·46 ¹⁵
30·7	12 ^s ·942 ⁶⁰	49 ["] ·86 ⁹²	33 ^s ·49 ¹⁷	78 ["] ·56 ¹⁴⁷	43 ^s ·699 ⁵⁹	42 ["] ·61 ⁷
June 9·6	12 ^s ·882 ³⁰	48 ["] ·94 ¹⁰²	33 ^s ·32 ¹¹	77 ["] ·09 ¹⁷⁸	43 ^s ·640 ²⁷	42 ["] ·68 ¹
19·6	12 ^s ·852 ¹	47 ["] ·92 ¹⁰⁹	33 ^s ·21 ⁵	75 ["] ·31 ²⁰⁴	43 ^s ·613 ⁶	42 ["] ·67 ⁸
29·6	12 ^s ·851 ³¹	46 ["] ·83 ¹¹⁴	33 ^s ·16 ²	73 ["] ·27 ²²⁴	43 ^s ·619 ³⁹	42 ["] ·59 ¹⁵
July 9·6	12 ^s ·882 ⁶¹	45 ["] ·69 ¹¹⁴	33 ^s ·18 ⁹	71 ["] ·03 ²³⁹	43 ^s ·658 ⁷¹	42 ["] ·44 ²³
19·5	12 ^s ·943 ⁹¹	44 ["] ·55 ¹¹¹	33 ^s ·27 ¹⁶	68 ["] ·64 ²⁴⁹	43 ^s ·729 ¹⁰³	42 ["] ·21 ³¹
29·5	13 ^s ·034 ¹²⁰	43 ["] ·44 ¹⁰³	33 ^s ·43 ²²	66 ["] ·15 ²⁵³	43 ^s ·832 ¹³⁴	41 ["] ·90 ⁴⁰
Aug. 8·5	13 ^s ·154 ¹⁴⁹	42 ["] ·41 ⁹⁰	33 ^s ·65 ²⁸	63 ["] ·62 ²⁵⁴	43 ^s ·966 ¹⁶³	41 ["] ·50 ⁵¹
18·4	13 ^s ·303 ¹⁷⁶	41 ["] ·51 ⁷²	33 ^s ·93 ³⁴	61 ["] ·08 ²⁴⁹	44 ^s ·129 ¹⁹²	40 ["] ·99 ⁶¹
28·4	13 ^s ·479 ²⁰²	40 ["] ·79 ⁵⁰	34 ^s ·27 ³⁹	58 ["] ·59 ²⁴⁰	44 ^s ·321 ²¹⁹	40 ["] ·38 ⁷³
Sept. 7·4	13 ^s ·681 ²²⁷	40 ["] ·29 ²³	34 ^s ·66 ⁴⁵	56 ["] ·19 ²²⁶	44 ^s ·540 ²⁴⁵	39 ["] ·65 ⁸⁵
17·4	13 ^s ·908 ²⁵¹	40 ["] ·06 ⁶	35 ^s ·11 ⁴⁹	53 ["] ·93 ²⁰⁹	44 ^s ·785 ²⁶⁹	38 ["] ·80 ⁹⁸
27·3	14 ^s ·159 ²⁷³	40 ["] ·12 ³⁹	35 ^s ·60 ⁵³	51 ["] ·84 ¹⁸⁶	45 ^s ·054 ²⁹¹	37 ["] ·82 ¹¹⁰
Oct. 7·3	14 ^s ·432 ²⁹¹	40 ["] ·51 ⁷²	36 ^s ·13 ⁵⁶	49 ["] ·98 ¹⁶⁰	45 ^s ·345 ³¹³	36 ["] ·72 ¹²¹
17·3	14 ^s ·723 ³⁰⁶	41 ["] ·23 ¹⁰⁴	36 ^s ·69 ⁵⁹	48 ["] ·38 ¹²⁹	45 ^s ·658 ³³⁰	35 ["] ·51 ¹²⁹
27·3	15 ^s ·029 ³¹⁷	42 ["] ·27 ¹³⁵	37 ^s ·28 ⁶⁰	47 ["] ·09 ⁹⁴	45 ^s ·988 ³⁴²	34 ["] ·22 ¹³⁴
Nov. 6·2	15 ^s ·346 ³²⁰	43 ["] ·62 ¹⁶¹	37 ^s ·88 ⁶⁰	46 ["] ·15 ⁵⁶	46 ^s ·330 ³⁴⁸	32 ["] ·88 ¹³⁵
16·2	15 ^s ·666 ³¹⁶	45 ["] ·23 ¹⁸³	38 ^s ·48 ⁶⁰	45 ["] ·59 ¹⁵	46 ^s ·678 ³⁴⁶	31 ["] ·53 ¹³²
26·2	15 ^s ·982 ³⁰⁵	47 ["] ·06 ¹⁹⁸	39 ^s ·08 ⁵⁸	45 ["] ·44 ²⁷	47 ^s ·024 ³³⁶	30 ["] ·21 ¹²³
Dec. 6·1	16 ^s ·287 ²⁸⁴	49 ["] ·04 ²⁰⁶	39 ^s ·66 ⁵⁴	45 ["] ·71 ⁷⁰	47 ^s ·360 ³¹⁷	28 ["] ·98 ¹¹⁰
16·1	16 ^s ·571 ²⁵⁴	51 ["] ·10 ²⁰⁹	40 ^s ·20 ⁴⁸	46 ["] ·41 ¹¹¹	47 ^s ·677 ²⁸⁷	27 ["] ·88 ⁹³
26·1	16 ^s ·825 ²¹⁸	53 ["] ·19 ²⁰³	40 ^s ·68 ⁴⁰	47 ["] ·52 ¹⁴⁸	47 ^s ·964 ²⁴⁹	26 ["] ·95 ⁷³
36·1	17 ^s ·043	55 ["] ·22	41 ^s ·08	49 ["] ·00	48 ^s ·213	26 ["] ·22
Mean Place	12·751	48·92	32·806	62·31	43·220	36·57
Sec δ, Tan δ	1·002	—0·064	2·059	+1·800	1·069	+0·377
a, a'	+3·0	—11·7	+5·0	—11·8	+3·5	—12·1
b, b'	0·00	—0·8	—0·07	—0·8	—0·02	—0·8
Authority and Catalogue No.	B.J.	509	B.J.	512	B.J.	517

APPARENT PLACES OF STARS, 1931.

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AT UPPER TRANSIT AT GREENWICH.

Name Mag. Spect.	γ Cancr		α Pyxidis		δ Argus m.	
	4.73	Ao	3.70	B ₂	2.01	Ao
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ^m 08 39	[°] ['] +21 42	^h ^m 08 40	[°] ['] -32 55	^h ^m 08 42	[°] ['] -54 27
Jan. 1.1	18 ^s .740	66 ^s .70	49 ^s .969	59 ^s .81	49 ^s .179	02 ^s .42
11.1	18.973 ²³³	66.13 ⁵⁷	50.167 ¹⁹⁸	63.05 ³²⁴	49.396 ²¹⁷	06.12 ³⁷⁰
21.0	19.157 ¹⁸⁴	65.81 ³²	50.312 ¹⁴⁵	66.27 ³²²	49.538 ¹⁴²	09.89 ³⁷⁷
31.0	19.287 ¹³⁰	65.70 ¹¹	50.400 ⁸⁸	69.39 ³¹²	49.603 ⁶⁵	13.64 ³⁷⁵
Feb. 9.9	19.362 ⁷⁵	65.81 ¹¹	50.432 ³²	72.33 ²⁹⁴	49.592 ¹¹	17.26 ³⁶²
	23	28	22	270	84	340
19.9	19.385	66.09	50.410	75.03	49.508	20.66
Mar. 1.9	19.358 ²⁷	66.51 ⁴²	50.337 ⁷³	77.43 ²⁴⁰	49.358 ¹⁵⁰	23.77 ³¹¹
11.9	19.287 ⁷¹	67.02 ⁵¹	50.222 ¹¹⁵	79.49 ²⁰⁶	49.150 ²⁰⁸	26.53 ²⁷⁶
21.9	19.181 ¹⁰⁶	67.59 ⁵⁷	50.073 ¹⁴⁹	81.17 ¹⁶⁸	48.896 ²⁵⁴	28.88 ²³⁵
31.8	19.050 ¹³¹	68.16 ⁵⁷	49.898 ¹⁷⁵	82.46 ¹²⁹	48.606 ²⁹⁰	30.78 ¹⁹⁰
	147	55	192	89	314	143
Apr. 10.8	18.903	68.71	49.706	83.35	48.292	32.21
20.8	18.751 ¹⁵²	69.21 ⁵⁰	49.508 ¹⁹⁸	83.83 ⁴⁸	47.965 ³²⁷	33.14 ⁹³
30.8	18.603 ¹⁴⁸	69.63 ⁴²	49.312 ¹⁹⁶	83.89 ⁶	47.637 ³²⁸	33.56 ⁴²
May 10.7	18.467 ¹³⁶	69.97 ³⁴	49.126 ¹⁸⁶	83.55 ³⁴	47.317 ³²⁰	33.47 ⁹
20.7	18.349 ¹¹⁸	70.21 ²⁴	48.956 ¹⁷⁰	82.82 ⁷³	47.014 ³⁰³	32.88 ⁵⁹
	93	15	148	110	276	108
30.7	18.256	70.36	48.808	81.72	46.738	31.80
June 9.6	18.190 ⁶⁶	70.42 ⁶	48.685 ¹²³	80.27 ¹⁴⁵	46.494 ²⁴⁴	30.27 ¹⁵³
19.6	18.155 ³⁵	70.42 ⁴	48.592 ⁹³	78.53 ¹⁷⁴	46.289 ²⁰⁵	28.34 ¹⁹³
29.6	18.151 ⁴	70.25 ¹³	48.531 ⁶¹	76.52 ²⁰¹	46.127 ¹⁶²	26.04 ²³⁰
July 9.6	18.180 ²⁹	70.03 ²²	48.504 ²⁷	74.33 ²¹⁹	46.015 ¹¹²	23.46 ²⁵⁸
	61	30	8	233	59	280
19.5	18.241	69.73	48.512	72.00	45.956	20.66
29.5	18.333 ⁹²	69.33 ⁴⁰	48.557 ⁴⁵	69.61 ²³⁹	45.952 ⁴	17.72 ²⁹⁴
Aug. 8.5	18.457 ¹²⁴	68.83 ⁵⁰	48.639 ⁸²	67.24 ²³⁷	46.005 ⁵³	14.75 ²⁹⁷
18.5	18.610 ¹⁵³	68.23 ⁶⁰	48.757 ¹¹⁸	64.97 ²²⁷	46.117 ¹¹²	11.84 ²⁹¹
28.4	18.792 ¹⁸²	67.52 ⁷¹	48.911 ¹⁵⁴	62.89 ²⁰⁸	46.286 ¹⁶⁹	09.09 ²⁷⁵
	211	84	191	180	226	247
Sept. 7.4	19.003	66.68	49.102	61.09	46.512	06.62
17.4	19.241 ²³⁸	65.72 ⁹⁶	49.328 ²²⁶	59.63 ¹⁴⁶	46.793 ²⁸¹	04.51 ²¹¹
27.3	19.505 ²⁶⁴	64.64 ¹⁰⁸	49.587 ²⁵⁹	58.61 ¹⁰²	47.124 ³³¹	02.86 ¹⁶⁵
Oct. 7.3	19.792 ²⁸⁷	63.45 ¹¹⁹	49.874 ²⁸⁷	58.07 ⁵⁴	47.499 ³⁷⁵	01.74 ¹¹²
17.3	20.103 ³¹¹	62.15 ¹³⁰	50.188 ³¹⁴	58.05 ²	47.910 ⁴¹¹	01.22 ⁵²
	329	137	334	54	438	11
27.3	20.432	60.78	50.522	58.59	48.348	01.33
Nov. 6.2	20.774 ³⁴²	59.37 ¹⁴¹	50.869 ³⁴⁷	59.67 ¹⁰⁸	48.799 ⁴⁵¹	02.10 ⁷⁷
16.2	21.125 ³⁵¹	57.96 ¹⁴¹	51.220 ³⁵¹	61.28 ¹⁶¹	49.254 ⁴⁵⁵	03.50 ¹⁴⁰
26.2	21.476 ³⁵¹	56.61 ¹³⁵	51.567 ³⁴⁷	63.36 ²⁰⁸	49.696 ⁴⁴²	05.50 ²⁰⁰
Dec. 6.2	21.818 ³⁴²	55.34 ¹²⁷	51.900 ³³³	65.86 ²⁵⁰	50.113 ⁴¹⁷	08.04 ²⁵⁴
	324	112	308	284	377	300
16.1	22.142	54.22	52.208	68.70	50.490	11.04
26.1	22.439 ²⁹⁷	53.28 ⁹⁴	52.482 ²⁷⁴	71.77 ³⁰⁷	50.815 ³²⁵	14.40 ³³⁶
36.1	22.699 ²⁶⁰	52.55 ⁷³	52.712 ²³⁰	74.99 ³²²	51.076 ²⁶¹	18.02 ³⁶²
Mean Place	17.709	64.31	49.060	71.95	47.853	17.86
Sec δ , Tan δ	1.076	+0.398	1.192	-0.648	1.720	-1.400
a, a'	+3.5	-12.8	+2.4	-12.9	+1.7	-13.1
b, b'	-0.02	-0.8	+0.03	-0.8	+0.06	-0.8
Authority and Catalogue No.	N.A.	527	B.J.	529	B.J.	531

† First transit, Jan. 31.

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name Mag. Spect.	ε Hydræ m.		ζ Hydræ		ι Ursæ Majoris	
	3·53	F8	3·30	Ko	3·12	A5
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ^m 08 43	[°] ['] +6 40	^h ^m 08 51	[°] ['] +6 12	^h ^m 08 54	[°] ['] +48 18
Jan. 1·1	08·242 ^s ₂₁₇	27·88 ^s ₁₄₄	45·663 ^s ₂₂₅	37·94 ^s ₁₅₀	31·183 ^s ₃₂₁	47·80 ^s ₈₃
11·1	08·459 ^s ₁₇₁	26·44 ^s ₁₂₆	45·888 ^s ₁₇₉	36·44 ^s ₁₃₁	31·504 ^s ₂₅₇	48·63 ^s ₁₁₇
21·0	08·630 ^s ₁₂₂	25·18 ^s ₁₀₆	46·067 ^s ₁₃₀	35·13 ^s ₁₁₁	31·761 ^s ₁₈₇	49·80 ^s ₁₄₄
31·0	08·752 ^s ₇₀	24·12 ^s ₈₄	46·197 ^s ₇₉	34·02 ^s ₈₉	31·948 ^s ₁₁₃	51·24 ^s ₁₆₃
Feb. 9·9	08·822 ^s ₂₀	23·28 ^s ₆₃	46·276 ^s ₂₉	33·13 ^s ₆₆	32·061 ^s ₃₉	52·87 ^s ₁₇₆
19·9	08·842 ^s ₂₅	22·65 ^s ₄₂	46·305 ^s ₁₈	32·47 ^s ₄₆	32·100 ^s ₃₁	54·63 ^s ₁₈₀
Mar. 1·9	08·817 ^s ₆₆	22·23 ^s ₂₄	46·287 ^s ₅₉	32·01 ^s ₂₆	32·069 ^s ₉₄	56·43 ^s ₁₇₅
11·9	08·751 ^s ₉₈	21·99 ^s ₇	46·228 ^s ₉₂	31·75 ^s ₉	31·975 ^s ₁₄₆	58·18 ^s ₁₆₂
21·9	08·653 ^s ₁₂₁	21·92 ^s ₆	46·136 ^s ₁₁₆	31·66 ^s ₅	31·829 ^s ₁₈₆	59·80 ^s ₁₄₁
31·8	08·532 ^s ₁₃₆	21·98 ^s ₁₉	46·020 ^s ₁₃₂	31·71 ^s ₁₈	31·643 ^s ₂₁₃	61·21 ^s ₁₁₆
Apr. 10·8	08·396 ^s ₁₄₂	22·17 ^s ₂₉	45·888 ^s ₁₃₉	31·89 ^s ₂₈	31·430 ^s ₂₂₇	62·37 ^s ₈₅
20·8	08·254 ^s ₁₃₈	22·46 ^s ₃₆	45·749 ^s ₁₃₇	32·17 ^s ₃₆	31·203 ^s ₂₂₈	63·22 ^s ₅₂
30·8	08·116 ^s ₁₂₈	22·82 ^s ₄₃	45·612 ^s ₁₂₈	32·53 ^s ₄₃	30·975 ^s ₂₁₇	63·74 ^s ₁₇
May 10·7	07·988 ^s ₁₁₁	23·25 ^s ₄₈	45·484 ^s ₁₁₃	32·96 ^s ₄₉	30·758 ^s ₁₉₆	63·91 ^s ₅₀
20·7	07·877 ^s ₉₀	23·73 ^s ₅₂	45·371 ^s ₉₂	33·45 ^s ₅₃	30·562 ^s ₁₆₇	63·74 ^s ₁₇
30·7	07·787 ^s ₆₅	24·25 ^s ₅₆	45·279 ^s ₆₉	33·98 ^s ₅₆	30·395 ^s ₁₃₁	63·24 ^s ₈₂
June 9·7	07·722 ^s ₃₇	24·81 ^s ₅₇	45·210 ^s ₄₃	34·54 ^s ₅₈	30·264 ^s ₉₁	62·42 ^s ₁₁₁
19·6	07·685 ^s ₉	25·38 ^s ₅₈	45·167 ^s ₁₆	35·12 ^s ₅₉	30·173 ^s ₄₇	61·31 ^s ₁₃₆
29·6	07·676 ^s ₂₀	25·96 ^s ₅₃	45·151 ^s ₄₂	35·71 ^s ₅₄	30·126 ^s ₃	59·95 ^s ₁₅₈
July 9·6	07·696 ^s ₅₀	26·53 ^s ₅₃	45·165 ^s ₇₁	36·28 ^s ₄₈	30·123 ^s ₄₄	58·37 ^s ₁₇₇
19·5	07·746 ^s ₇₉	27·06 ^s ₃₇	45·207 ^s ₉₉	36·82 ^s ₃₉	30·167 ^s ₈₉	56·60 ^s ₁₉₃
29·5	07·825 ^s ₁₀₈	27·53 ^s ₂₆	45·278 ^s ₁₂₈	37·30 ^s ₂₇	30·256 ^s ₁₃₃	54·67 ^s ₂₁₂
Aug. 8·5	07·933 ^s ₁₆₃	27·91 ^s ₁₁	45·377 ^s ₁₅₅	37·69 ^s ₁₁	30·389 ^s ₂₆₀	52·63 ^s ₂₁₈
18·5	08·069 ^s ₁₉₁	28·17 ^s ₂₈	45·505 ^s ₂₀₉	37·96 ^s ₅₁	30·566 ^s ₃₃₇	50·51 ^s ₂₁₇
28·4	08·232 ^s ₂₁₇	28·28 ^s ₅₁	45·660 ^s ₂₃₆	38·07 ^s ₇₅	30·785 ^s ₄₀₃	48·34 ^s ₂₁₈
Sept. 7·4	08·423 ^s ₂₇₄	28·21 ^s ₇₄	45·843 ^s ₂₆₁	38·01 ^s ₉₉	31·045 ^s ₄₂₉	46·16 ^s ₁₇₀
17·4	08·640 ^s ₂₈₈	27·93 ^s ₁₂₁	46·052 ^s ₃₀₃	37·73 ^s ₁₂₃	31·045 ^s ₃₀₀	43·99 ^s ₂₁₇
27·4	08·882 ^s ₂₆₆	27·42 ^s ₇₄	46·288 ^s ₂₆₁	37·22 ^s ₇₅	31·345 ^s ₃₃₇	43·99 ^s ₂₁₁
Oct. 7·3	09·148 ^s ₃₀₇	26·68 ^s ₉₉	46·549 ^s ₂₈₄	36·47 ^s ₉₉	31·682 ^s ₃₇₁	41·88 ^s ₂₀₁
17·3	09·436 ^s ₃₂₀	25·69 ^s ₁₄₁	46·833 ^s ₃₁₉	35·48 ^s ₁₄₃	32·053 ^s ₄₅₁	39·87 ^s ₁₈₈
27·3	09·743 ^s ₃₂₈	24·48 ^s ₁₅₇	47·136 ^s ₃₂₉	34·25 ^s ₁₆₁	32·456 ^s ₄₆₅	37·99 ^s ₁₆
Nov. 6·2	10·063 ^s ₃₂₈	23·07 ^s ₁₆₈	47·455 ^s ₃₃₀	32·82 ^s ₁₇₈	32·885 ^s ₄₃₆	36·29 ^s ₁₄₈
16·2	10·391 ^s ₃₂₂	21·50 ^s ₁₇₄	47·784 ^s ₃₀₈	31·21 ^s ₁₇₉	33·336 ^s ₄₀₁	34·81 ^s ₁₂₀
26·2	10·719 ^s ₃₀₃	19·82 ^s ₁₆₇	48·114 ^s ₂₈₄	29·49 ^s ₁₇₃	33·799 ^s ₃₅₅	33·61 ^s ₈₉
Dec. 6·2	11·041 ^s ₂₇₈	18·07 ^s ₁₅₆	48·438 ^s ₂₅₀	27·71 ^s ₁₆₂	34·264 ^s ₃₂	32·72 ^s ₅₄
16·1	11·344 ^s ₂₄₃	16·33 ^s ₁₃	48·746 ^s ₁₃	25·92 ^s ₁₃	34·721 ^s ₁₃	32·18 ^s ₁₆
26·1	11·622 ^s ₂₄₃	14·66 ^s ₁₃	49·030 ^s ₁₃	24·19 ^s ₁₃	35·157 ^s ₁₃	32·02 ^s ₂₁
36·1	11·865 ^s ₂₄₃	13·10 ^s ₁₃	49·280 ^s ₁₃	22·57 ^s ₁₃	35·558 ^s ₁₃	32·23 ^s ₅₉
Mean Place Sec δ, Tan δ	07·372 1·007	23·00 +0·117	44·821 1·006	33·21 +0·109	29·518 1·504	50·10 +1·123
a, a'	+3·2	-13·1	+3·2	-13·7	+4·2	-13·8
b, b'	-0·01	-0·8	0·00	-0·7	-0·05	-0·7
Authority and Catalogue No.	A.N.	532	B.J.	539	B.J.	542

APPARENT PLACES OF STARS, 1931.

413

AT UPPER TRANSIT AT GREENWICH.

Name Mag. Spect.	α Cancr		κ Cancr		ξ Cancr	
	4.27	A3	5.14	B8	5.22	G5
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 08 ^m 54	[°] +12 ['] 07	^h 09 ^m 04	[°] +10 ['] 56	^h 09 ^m 05	[°] +22 ['] 19
Jan. 1.1	^s 43.754	["] 36.95	^s 01.500	["] 52.48	^s 24.623	["] 33.23
11.1	43.987 ²³³	35.76 ¹¹⁹	01.740 ²⁴⁰	51.19 ¹²⁹	24.879 ²⁵⁶	32.57 ⁶⁶
21.0	44.175 ¹⁸⁸	34.78 ⁹⁸	01.935 ¹⁹⁵	50.11 ¹⁰⁸	25.090 ²¹¹	32.17 ⁴⁰
31.0	44.313 ¹³⁸	34.03 ⁷⁵	02.080 ¹⁴⁵	49.26 ⁸⁵	25.248 ¹⁵⁸	32.01 ¹⁶
Feb. 9.9	44.399 ⁸⁶	33.50 ⁵³	02.174 ⁹⁴	48.63 ⁶³	25.352 ¹⁰⁴	32.10 ⁹
	35 ³¹		43 ⁴⁰		49 ³⁰	
19.9	44.434 ¹³	33.19 ¹²	02.217 ⁴	48.23 ¹⁹	25.401 ¹	32.40 ⁴⁶
Mar. 1.9	44.421 ⁵⁵	33.07 ⁵	02.213 ⁴⁷	48.04 ²	25.400 ⁴⁸	32.86 ⁵⁸
11.9	44.366 ⁹⁰	33.12 ¹⁷	02.166 ⁸²	48.02 ¹²	25.352 ⁸⁵	33.44 ⁶⁶
21.9	44.276 ¹¹⁵	33.29 ²⁸	02.084 ¹⁰⁹	48.14 ²⁴	25.267 ¹¹⁵	34.10 ⁶⁷
31.9	44.161 ¹³²	33.57 ³⁵	01.975 ¹²⁷	48.38 ³²	25.152 ¹³⁵	34.77 ⁶⁶
Apr. 10.8	44.029 ¹³⁹	33.92 ³⁹	01.848 ¹³⁵	48.70 ³⁹	25.017 ¹⁴⁴	35.43 ⁶²
20.8	43.890 ¹³⁸	34.31 ⁴²	01.713 ¹³⁶	49.09 ⁴³	24.873 ¹⁴⁵	36.05 ⁵³
30.8	43.752 ¹²⁹	34.73 ⁴²	01.577 ¹²⁸	49.52 ⁴⁴	24.728 ¹³⁷	36.58 ⁴⁵
May 10.7	43.623 ¹¹⁴	35.15 ⁴²	01.449 ¹¹⁵	49.96 ⁴⁴	24.591 ¹²⁴	37.03 ³³
20.7	43.509 ⁹⁴	35.57 ⁴¹	01.334 ⁹⁷	50.40 ⁴⁴	24.467 ¹⁰⁴	37.36 ²¹
30.7	43.415 ⁷⁰	35.98 ³⁹	01.237 ⁷⁴	50.84 ⁴³	24.363 ⁸⁰	37.57 ¹⁰
June 9.7	43.345 ⁴³	36.37 ³⁶	01.163 ⁴⁹	51.27 ⁴¹	24.283 ⁵³	37.67 ²
19.6	43.302 ¹⁶	36.73 ³²	01.114 ²²	51.68 ³⁷	24.230 ²⁴	37.65 ¹³
29.6	43.286 ¹⁴	37.05 ²⁷	01.092 ⁵	52.05 ³²	24.206 ⁵	37.52 ²⁴
July 9.6	43.300 ⁴³	37.32 ²¹	01.097 ³⁴	52.37 ²⁶	24.211 ³⁶	37.28 ³⁷
19.6	43.343 ⁷²	37.53 ¹³	01.131 ⁶³	52.63 ¹⁸	24.247 ⁶⁷	36.91 ⁴⁸
29.5	43.415 ¹⁰¹	37.66 ³	01.194 ⁹⁰	52.81 ⁷	24.314 ⁹⁶	36.43 ⁶⁰
Aug. 8.5	43.516 ¹²⁹	37.69 ⁹	01.284 ¹¹⁹	52.88 ⁴	24.410 ¹²⁷	35.83 ⁷²
18.5	43.645 ¹⁵⁸	37.60 ²³	01.403 ¹⁴⁸	52.84 ¹⁹	24.537 ¹⁵⁷	35.11 ⁸⁵
28.4	43.803 ¹⁸⁵	37.37 ³⁹	01.551 ¹⁷⁵	52.65 ³⁶	24.694 ¹⁸⁶	34.26 ⁹⁸
Sept. 7.4	43.988 ²¹²	36.98 ⁵⁷	01.726 ²⁰³	52.29 ⁵⁵	24.880 ²¹⁶	33.28 ¹¹²
17.4	44.200 ²³⁹	36.41 ⁷⁷	01.929 ²³¹	51.74 ⁷⁵	25.096 ²⁴⁴	32.16 ¹²⁵
27.4	44.439 ²⁶⁵	35.64 ⁹⁷	02.160 ²⁵⁷	50.99 ⁹⁶	25.340 ²⁷¹	30.91 ¹³⁷
Oct. 7.3	44.704 ²⁸⁸	34.67 ¹¹⁶	02.417 ²⁸³	50.03 ¹¹⁶	25.611 ²⁹⁸	29.54 ¹⁴⁷
17.3	44.992 ³⁰⁸	33.51 ¹³⁴	02.700 ³⁰⁴	48.87 ¹³⁵	25.909 ³²¹	28.07 ¹⁵⁵
27.3	45.300 ³²⁵	32.17 ¹⁴⁸	03.004 ³²¹	47.52 ¹⁵¹	26.230 ³³⁹	26.52 ¹⁵⁸
Nov. 6.3	45.625 ³³⁵	30.69 ¹⁵⁸	03.325 ³³³	46.01 ¹⁶⁴	26.569 ³⁵¹	24.94 ¹⁵⁹
16.2	45.960 ³³⁷	29.11 ¹⁶⁴	03.658 ³³⁷	44.37 ¹⁶⁹	26.920 ³⁵⁷	23.35 ¹⁵³
26.2	46.297 ³³²	27.47 ¹⁶⁵	03.995 ³³³	42.68 ¹⁷¹	27.277 ³⁵²	21.82 ¹⁴³
Dec. 6.2	46.629 ³¹⁷	25.82 ¹⁵⁹	04.328 ³²⁰	40.97 ¹⁶⁷	27.629 ³⁴⁰	20.39 ¹²⁷
16.1	46.946 ²⁹³	24.23 ¹⁴⁸	04.648 ²⁹⁶	39.30 ¹⁵⁸	27.969 ³¹⁵	19.12 ¹⁰⁸
26.1	47.239 ²⁵⁹	22.75 ¹³²	04.944 ²⁶⁴	37.72 ¹⁴²	28.284 ²⁸³	18.04 ⁸⁴
36.1	47.498	21.43	05.298	36.30	28.567	17.20
Mean Place	42.873	33.45	00.658	49.05	23.654	32.13
Sec δ , Tan δ	1.023	+0.215	1.019	+0.193	1.081	+0.411
a, a'	+3.3	-13.8	+3.3	-14.4	+3.5	-14.5
b, b'	-0.01	-0.7	-0.01	-0.7	-0.02	-0.7
Authority and Catalogue No.	B.J.	543	N.A.	556	N.A.	559

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name	λ Argus		β Argus		83 Cancr	
	2.22	K5	1.80	A0	6.60	F5
Mag. Spect.						
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 09 ^m 05	[°] —43 ['] 08	^h 09 ^m 12	[°] —69 ['] 25	^h 09 ^m 15	[°] +17 ['] 59
Jan. 1.1	28.248 ^s	56.99	28.92 ^s	39.42	08.806 ^s	57.33
11.1	28.482 ^s	60.45	29.27 ^s	43.05	09.064 ^s	56.37
21.1	28.657 ^s	63.99	29.50 ^s	46.88	09.277 ^s	55.66
31.0	28.770 ^s	67.50	29.61 ^s	50.81	09.441 ^s	55.20
Feb. 9.9	28.820 ^s	70.90	29.61†	54.71	09.551†	54.99
19.9	28.809 ^s	74.10	29.49 ^s	58.50	09.609 ^s	55.01
Mar. 1.9	28.741 ^s	77.03	29.26 ^s	62.08	09.616 ^s	55.22
11.9	28.623 ^s	79.63	28.94 ^s	65.38	09.579 ^s	55.57
21.9	28.464 ^s	81.87	28.54 ^s	68.33	09.504 ^s	56.04
31.9	28.272 ^s	83.70	28.07 ^s	70.88	09.399 ^s	56.58
Apr. 10.8	28.057 ^s	85.09	27.55 ^s	72.97	09.273 ^s	57.14
20.8	27.829 ^s	86.04	26.99 ^s	74.58	09.137 ^s	57.70
30.8	27.596 ^s	86.53	26.41 ^s	75.66	08.998 ^s	58.23
May 10.8	27.368 ^s	86.56	25.83 ^s	76.22	08.865 ^s	58.70
20.7	27.152 ^s	86.13	25.26 ^s	76.24	08.745 ^s	59.10
30.7	26.953 ^s	85.27	24.71 ^s	75.73	08.642 ^s	59.43
June 9.7	26.778 ^s	83.99	24.20 ^s	74.70	08.560 ^s	59.67
19.6	26.631 ^s	82.34	23.74 ^s	73.18	08.504 ^s	59.82
29.6	26.516 ^s	80.37	23.33 ^s	71.21	08.474 ^s	59.89
July 9.6	26.436 ^s	78.11	23.00 ^s	68.86	08.472 ^s	59.86
19.6	26.394 ^s	75.65	22.75 ^s	66.19	08.498 ^s	59.72
29.5	26.393 ^s	73.05	22.59 ^s	63.29	08.553 ^s	59.47
Aug. 8.5	26.435 ^s	70.40	22.53 ^s	60.24	08.637 ^s	59.11
18.5	26.520 ^s	67.80	22.57 ^s	57.15	08.750 ^s	58.62
28.5	26.650 ^s	65.33	22.71 ^s	54.11	08.892 ^s	57.98
Sept. 7.4	26.824 ^s	63.10	22.96 ^s	51.26	09.063 ^s	57.19
17.4	27.043 ^s	61.20	23.31 ^s	48.68	09.263 ^s	56.24
27.4	27.304 ^s	59.71	23.75 ^s	46.50	09.492 ^s	55.13
Oct. 7.3	27.603 ^s	58.70	24.27 ^s	44.80	09.749 ^s	53.86
17.3	27.937 ^s	58.24	24.87 ^s	43.65	10.033 ^s	52.45
27.3	28.298 ^s	58.37	25.52 ^s	43.14	10.341 ^s	50.92
Nov. 6.3	28.679 ^s	59.10	26.20 ^s	43.28	10.669 ^s	49.29
16.2	29.070 ^s	60.42	26.89 ^s	44.10	11.011 ^s	47.62
26.2	29.459 ^s	62.30	27.57 ^s	45.57	11.360 ^s	45.95
Dec. 6.2	29.835 ^s	64.68	28.22 ^s	47.66	11.707 ^s	44.34
16.2	30.187 ^s	67.50	28.81 ^s	50.30	12.042 ^s	42.85
26.1	30.502 ^s	70.65	29.32 ^s	53.41	12.355 ^s	41.52
36.1	30.770 ^s	74.04	29.74 ^s	56.88	12.637 ^s	40.40
Mean Place	27.363	71.56	27.055	57.96	07.926	55.79
Sec δ , Tan δ	1.371	—0.938	2.847	—2.665	1.051	+0.325
a, a'	+2.2	—14.5	+0.7	—14.9	+3.4	—15.1
b, b'	+0.05	—0.7	+0.13	—0.7	—0.02	—0.7
Authority and Catalogue No.	B.J.	560	B.J.	566	B.J.	569

† Second transit, Feb. 9.

APPARENT PLACES OF STARS, 1931.

415

AT UPPER TRANSIT AT GREENWICH.

Name	α Argus			40 Lyncis			θ Pyxidis		
	2·25		Fo	3·30		K5	4·93		Ma
Mean Solar Date	R.A.		Dec.	R.A.		Dec.	R.A.		Dec.
	^h 09	^m 15	—58° 58'	^h 09	^m 16	+34° 40'	^h 09	^m 18	—25° 40'
Jan. 1·1	15 ^s 785	286	49°29' 362	52 ^s 555	294	65°69' 6	26 ^s 856	235	04°11' 297
11·1	16·071	207	52°91' 379	52·849	244	65·63 27	27·091	189	07·08 296
21·1	16·278	124	56·70 385	53·093	187	65·90 56	27·280	138	10·04 290
31·0	16·402	40	60·55 380	53·280	127	66·46 82	27·418	84	12·94 273
Feb. 10·0	9 16·442†	43	64·35 366	53·407†	66	67·28 102	27·502†	32	15·67 252
19·9	16·399	118	68·01 344	53·473	8	68·30 116	27·534	17	18·19 226
Mar. 1·9	16·281	186	71·45 314	53·481	44	69·46 123	27·517	61	20·45 197
11·9	16·095	244	74·59 278	53·437	89	70·69 123	27·456	98	22·42 164
21·9	15·851	291	77·37 237	53·348	125	71·92 117	27·358	126	24·06 130
31·9	15·560	326	79·74 192	53·223	150	73·09 105	27·232	147	25·36 96
Apr. 10·8	15·234	350	81·66 143	53·073	164	74·14 88	27·085	159	26·32 59
20·8	14·884	363	83·09 93	52·909	168	75·02 69	26·926	162	26·91 24
30·8	14·521	363	84·02 41	52·741	162	75·71 47	26·764	159	27·15 10
May 10·8	14·158	354	84·43 62	52·579	149	76·18 24	26·605	150	27·05 45
20·7	13·804	337	84·32 62	52·430	129	76·42 —	26·455	135	26·60 77
30·7	13·467	309	83·70 111	52·301	104	76·42 23	26·320	116	25·83 106
June 9·7	13·158	275	82·59 156	52·197	76	76·19 45	26·204	94	24·77 134
19·6	12·883	234	81·03 198	52·121	45	75·74 66	26·110	70	23·43 157
29·6	12·649	185	79·05 233	52·076	11	75·08 86	26·040	41	21·86 176
July 9·6	12·464	131	76·72 262	52·065	24	74·22 103	25·999	13	20·10 189
19·6	12·333	73	74·10 283	52·089	57	73·19 119	25·986	18	18·21 196
29·5	12·260	11	71·27 295	52·146	92	72·00 134	26·004	50	16·25 198
Aug. 8·5	12·249	56	68·32 297	52·238	125	70·66 146	26·054	82	14·27 190
18·5	12·305	124	65·35 289	52·363	159	69·20 158	26·136	116	12·37 176
28·5	12·429	191	62·46 270	52·522	193	67·62 168	26·252	151	10·61 154
Sept. 7·4	12·620	258	59·76 238	52·715	226	65·94 176	26·403	186	09·07 125
17·4	12·878	322	57·38 200	52·941	259	64·18 182	26·589	219	07·82 88
27·4	13·200	379	55·38 151	53·200	291	62·36 185	26·808	251	06·94 47
Oct. 7·3	13·579	429	53·87 95	53·491	321	60·51 185	27·059	283	06·47 1
17·3	14·008	468	52·92 33	53·812	347	58·66 181	27·342	307	06·46 49
27·3	14·476	496	52·59 32	54·159	370	56·85 173	27·649	327	06·95 97
Nov. 6·3	14·972	508	52·91 97	54·529	386	55·12 160	27·976	341	07·92 144
16·2	15·480	504	53·88 161	54·915	393	53·52 142	28·317	345	09·36 189
26·2	15·984	484	55·49 219	55·308	392	52·10 119	28·662	340	11·25 227
Dec. 6·2	16·468	448	57·68 272	55·700	379	50·91 91	29·002	324	13·52 257
16·2	16·916	397	60·40 315	56·079	355	50·00 61	29·326	298	16·09 282
26·1	17·313	334	63·55 350	56·434	321	49·39 28	29·624	263	18·91 295
36·1	17·647		67·05	56·755		49·11	29·887		21·86
Mean Place	14·603	66·69		51·394	67·47		26·185	15·46	
Sec δ, Tan δ	1·941	—1·663		1·216	+0·692		1·110	—0·481	
a, a'	+1·6	—15·1		+3·7	—15·2		+2·7	—15·3	
b, b'	+0·08	—0·7		—0·03	—0·7		+0·02	—0·6	
Authority and Catalogue No.	A.N.		570	B.J.		571	N.A.		572

† Second transit, Feb. 9.

† First transit, Feb. 10.

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name	κ Argus		α Hydræ		ψ Argus m.	
	2.63	B3	2.16	K2	3.64	F5
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 09 ^m 19	[°] —54 ['] 42	^h 09 ^m 24	[°] —8 ['] 21	^h 09 ^m 27	[°] —40 ['] 09
Jan. 1.1	59.530 ^s 278	38.31	12.429 ^s	23.86	59.502 ^s	35.40
11.1	59.808 208	41.89 358	12.671 242	26.16 230	59.759 257	38.75 335
21.1	60.016 133	45.63 374	12.870 199	28.36 220	59.962 203	42.19 344
31.0	60.149 133	49.42 379	13.021 151	30.40 204	60.107 145	45.63 344
Feb. 10.0	60.206† 57	53.15 373	13.123 102	32.24 184	60.192 85	48.97 334
19.9	60.189 17	56.74 359	13.175 52	33.84 160	60.218 26	52.14 317
Mar. 1.9	60.102 87	60.11 337	13.181 6	35.20 136	60.188 30	55.07 293
11.9	59.953 149	63.18 307	13.144 37	36.30 110	60.108 80	57.71 264
21.9	59.751 202	65.89 271	13.072 72	37.14 84	59.985 123	60.00 229
31.9	59.506 245	68.19 230	12.972 100	37.73 59	59.829 156	61.92 192
Apr. 10.8	59.228 278	70.06 187	12.853 119	38.08 35	59.647 182	63.43 151
20.8	58.930 298	71.45 139	12.723 130	38.20 12	59.448 199	64.52 109
30.8	58.621 309	72.34 89	12.589 134	38.10 10	59.242 206	65.18 66
May 10.8	58.310 311	72.74 40	12.458 131	37.80 30	59.036 206	65.40 22
20.7	58.007 303	72.63 11	12.337 121	37.31 49	58.836 200	65.18 22
30.7	57.720 287	72.03 60	12.230 107	36.64 67	58.650 186	64.54 64
June 9.7	57.456 264	70.95 108	12.141 89	35.82 82	58.482 168	63.50 104
19.7	57.223 233	69.43 152	12.072 69	34.87 95	58.337 145	62.08 142
29.6	57.026 197	67.50 193	12.026 46	33.81 106	58.219 118	60.32 176
July 9.6	56.871 155	65.23 227	12.005 21	32.68 113	58.131 88	58.28 204
19.6	56.762 109	62.68 255	12.010 5	31.50 118	58.077 54	56.03 225
29.5	56.704 58	59.93 275	12.042 32	30.33 117	58.058 19	53.62 241
Aug. 8.5	56.701 3	57.06 287	12.101 59	29.21 112	58.078 20	51.14 248
18.5	56.755 54	54.18 288	12.189 88	28.19 102	58.138 60	48.68 246
28.5	56.868 113	51.38 280	12.306 117	27.32 87	58.240 102	46.31 237
Sept. 7.4	57.042 174	48.77 261	12.452 146	26.66 66	58.386 146	44.14 217
17.4	57.275 233	46.44 233	12.629 177	26.25 41	58.575 189	42.27 187
27.4	57.564 289	44.52 192	12.836 207	26.13 12	58.806 231	40.76 151
Oct. 7.4	57.906 342	43.08 144	13.072 236	26.35 22	59.078 272	39.71 105
17.3	58.294 388	42.19 89	13.336 264	26.92 57	59.386 308	39.17 54
27.3	58.719 425	41.91 28	13.625 289	27.85 93	59.726 340	39.19 2
Nov. 6.3	59.171 452	42.27 36	13.934 309	29.14 129	60.090 364	39.78 59
16.2	59.637 466	43.26 99	14.258 324	30.75 161	60.470 380	40.95 117
26.2	60.103 466	44.88 162	14.588 330	32.63 188	60.854 384	42.67 172
Dec. 6.2	60.553 450	47.07 219	14.917 329	34.74 211	61.231 377	44.89 222
16.2	60.973 420	49.77 270	15.234 317	37.00 226	61.590 359	47.54 265
26.1	61.350 377	52.90 313	15.530 296	39.35 235	61.919 329	50.54 300
36.1	61.670 320	56.35 345	15.796 266	41.70 235	62.207 288	53.79 325
Mean Place	58.530	55.25	11.778	31.19	58.807	49.96
Sec δ, Tan δ	1.731	—1.413	1.011	—0.147	1.309	—0.844
a, a'	+1.9	—15.4	+2.9	—15.6	+2.4	—15.8
b, b'	+0.07	—0.6	+0.01	—0.6	+0.04	—0.6
Authority and Catalogue No.	B.J.	573	B.J.	576	B.J.	580

† First transit, Feb. 10.

APPARENT PLACES OF STARS, 1931.

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AT UPPER TRANSIT AT GREENWICH.

Name Mag. Spect.	ξ Leonis		θ Ursæ Majoris.		N Velorum	
	5.12	G5	3.26	F8p	3.04	K5
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 09 ^m 28	[°] +11 ['] 36	^h 09 ^m 28	[°] +51 ['] 59	^h 09 ^m 29	[°] -56 ['] 43
Jan. 1.1	14.443 ^s	25.29 ["]	16.902 ^s	29.15 ["]	08.368 ^s	28.33 ["]
11.1	14.703 ²⁶⁰	23.94 ¹³⁵	17.280 ³⁷⁸	29.88 ⁷³	08.668 ³⁰⁰	31.88 ³⁵⁵
21.1	14.921 ²¹⁸	22.80 ¹¹⁴	17.595 ³¹⁵	31.01 ¹¹³	08.896 ²²⁸	35.62 ³⁷⁴
31.0	15.090 ¹⁶⁹	21.91 ⁸⁹	17.838 ²⁴³	32.48 ¹⁴⁷	09.047 ¹⁵¹	39.44 ³⁸²
Feb. 10.0	15.209 ¹¹⁹	21.26 ⁶⁵	18.005 ¹⁶⁷	34.21 ¹⁷³	09.119 ⁷²	43.22 ³⁷⁸
	68	40	88	192	6	367
19.9	15.277 ¹²	20.86 ¹³	18.093 ¹¹	36.13 ²⁰²	09.113 ⁷⁸	46.89 ³⁴⁷
Mar. 1.9	15.296 ¹⁹	20.67 ¹⁹	18.104 ⁶¹	38.15 ²⁰²	09.035 ¹⁴⁵	50.36 ³¹⁸
11.9	15.271 ²⁵	20.68 ¹	18.043 ¹²²	40.17 ¹⁹²	08.890 ²⁰¹	53.54 ²⁸⁵
21.9	15.209 ⁶²	20.85 ¹⁷	17.921 ¹⁷²	42.09 ¹⁷⁵	08.689 ²⁴⁸	56.39 ²⁴⁵
31.9	15.117 ⁹²	21.13 ²⁸	17.749 ²¹⁰	43.84 ¹⁵⁰	08.441 ²⁸⁴	58.84 ²⁰²
Apr. 10.8	15.004 ¹¹³	21.51 ³⁸	17.539 ²³⁵	45.34 ¹¹⁹	08.157 ³⁰⁹	60.86 ¹⁵⁵
20.8	14.878 ¹²⁶	21.95 ⁴⁴	17.304 ²⁴⁵	46.53 ⁸⁴	07.848 ³²³	62.41 ¹⁰⁶
30.8	14.748 ¹³⁰	22.42 ⁴⁷	17.059 ²⁴³	47.37 ⁴⁶	07.525 ³²⁸	63.47 ⁵⁵
May 10.8	14.622 ¹¹⁸	22.90 ⁴⁸	16.816 ²³⁰	47.83 ⁸	07.197 ³²³	64.02 ⁴
20.7	14.504 ¹⁰³	23.38 ⁴⁵	16.586 ²⁰⁸	47.91 ³¹	06.874 ³⁰⁹	64.06 ⁴⁶
30.7	14.401 ⁸⁴	23.83 ⁴³	16.378 ¹⁷⁸	47.60 ⁶⁸	06.565 ²⁸⁸	63.60 ⁹⁵
June 9.7	14.317 ⁶¹	24.26 ³⁸	16.200 ¹⁴²	46.92 ¹⁰³	06.277 ²⁵⁸	62.65 ¹⁴²
19.7	14.256 ³⁹	24.64 ³³	16.058 ¹⁰²	45.89 ¹³⁶	06.019 ²²³	61.23 ¹⁸³
29.6	14.217 ¹³	24.97 ²⁷	15.956 ⁵⁸	44.53 ¹⁶⁴	05.796 ¹⁸¹	59.40 ²¹⁹
July 9.6	14.204 ¹³	25.24 ¹⁹	15.898 ¹²	42.89 ¹⁹⁰	05.615 ¹³³	57.21 ²⁵⁰
19.6	14.217 ⁴⁰	25.43 ¹⁰	15.886 ³⁵	40.99 ²¹¹	05.482 ⁸⁰	54.71 ²⁷²
29.5	14.257 ⁶⁷	25.53 ¹	15.921 ⁸²	38.88 ²²⁸	05.402 ²⁴	51.99 ²⁸⁶
Aug. 8.5	14.324 ⁹⁵	25.52 ¹⁵	16.003 ¹²⁹	36.60 ²⁴¹	05.378 ³⁶	49.13 ²⁹¹
18.5	14.419 ¹²⁴	25.37 ³⁰	16.132 ¹⁷⁶	34.19 ²⁵⁰	05.414 ⁹⁹	46.22 ²⁸⁴
28.5	14.543 ¹⁵³	25.07 ⁴⁷	16.308 ²²²	31.69 ²⁵⁶	05.513 ¹⁶⁴	43.38 ²⁶⁷
Sept. 7.4	14.696 ¹⁸²	24.60 ⁶⁶	16.530 ²⁶⁸	29.13 ²⁵⁷	05.677 ²²⁸	40.71 ²⁴¹
17.4	14.878 ²¹²	23.94 ⁸⁶	16.798 ³¹²	26.56 ²⁵²	05.905 ²⁸⁹	38.30 ²⁰³
27.4	15.090 ²⁴⁰	23.08 ¹⁰⁷	17.110 ³⁵⁵	24.04 ²⁴⁵	06.194 ³⁴⁵	36.27 ¹⁵⁶
Oct. 7.4	15.330 ²⁶⁹	22.01 ¹²⁷	17.465 ³⁹⁵	21.59 ²³²	06.539 ³⁹⁶	34.71 ¹⁰³
17.3	15.599 ²⁹⁴	20.74 ¹⁴⁵	17.860 ⁴³¹	19.27 ²¹²	06.935 ⁴³⁸	33.68 ⁴³
27.3	15.893 ³¹⁵	19.29 ¹⁶¹	18.291 ⁴⁶¹	17.15 ¹⁸⁹	07.373 ⁴⁶⁸	33.25 ²¹
Nov. 6.3	16.208 ³³¹	17.68 ¹⁷³	18.752 ⁴⁸²	15.26 ¹⁵⁹	07.841 ⁴⁸⁵	33.46 ⁸⁵
16.2	16.539 ³⁴¹	15.95 ¹⁸⁰	19.234 ⁴⁹⁴	13.67 ¹²⁵	08.326 ⁴⁸⁷	34.31 ¹⁴⁹
26.2	16.880 ³³⁹	14.15 ¹⁸¹	19.728 ⁴⁹⁴	12.42 ⁸⁵	08.813 ⁴⁴⁵	35.80 ²⁰⁸
Dec. 6.2	17.219 ³³¹	12.34 ¹⁷⁶	20.222 ⁴⁸⁰	11.57 ⁴³	09.286 ⁴⁴⁵	37.88 ²⁶⁰
16.2	17.550 ³¹²	10.58 ¹⁶⁶	20.702 ⁴⁵¹	11.14 [—]	09.731 ⁴⁰⁰	40.48 ³⁰⁵
26.1	17.862 ²⁸²	08.92 ¹⁴⁹	21.153 ⁴⁰⁹	11.14 ⁴³	10.131 ³⁴⁴	43.53 ³⁴²
36.1	18.144	07.43	21.562	11.57	10.475	46.95
Mean Place	13.680	22.83	15.176	34.39	07.407	45.89
Sec δ, Tan δ	1.021	+0.205	1.624	+1.280	1.823	-1.524
a, a'	+3.2	-15.8	+4.1	-15.8	+1.8	-15.9
b, b'	-0.01	-0.6	-0.07	-0.6	+0.08	-0.6
Authority and Catalogue No.	N.A.	583	B.J.	581	A.N.	584

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name	κ Hydræ		\circ Leonis		ϵ Leonis	
	4.96	B ₃ ¹	3.76	F5-A ₃	3.12	G _{0p}
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 09 ^m 36	[°] —14 ['] 00	^h 09 ^m 37	[°] +10 ['] 12	^h 09 ^m 41	[°] +24 ['] 05
Jan. 1.1	60.399 ^s	58.04	28.862 ^s	28.08	57.132 ^s	33.23
11.1	60.650 ²⁵¹	60.58 ²⁵⁴	29.127 ²⁶⁵	26.61 ¹⁴⁷	57.422 ²⁹⁰	32.44 ⁷⁹
21.1	60.859 ²⁰⁹	63.07 ²⁴⁹	29.351 ²²⁴	25.37 ¹²⁴	57.668 ²⁴⁶	31.96 ⁴⁸
31.0	61.021 ¹⁶²	65.43 ²³⁶	29.528 ¹⁷⁷	24.36 ¹⁰¹	57.866 ¹⁹⁸	31.78 ¹⁸
Feb. 10.0	61.133 ¹¹²	67.61 ²¹⁸	29.655 ¹²⁷	23.61 ⁷⁵	58.010 ¹⁴⁴	31.87 ⁹
15	61.133 ⁶²	67.61 ¹⁹⁶	29.655 ⁷⁷	23.61 ⁵¹	58.010 ⁸⁹	31.87 ³⁵
19.9	61.195 ¹⁴	69.57 ¹⁷²	29.732 ²⁸	23.10 ²⁹	58.099 ³⁶	32.22 ⁵⁶
Mar. 1.9	61.209 ²⁸	71.29 ¹⁴⁴	29.760 ¹⁷	22.81 ⁷	58.135 ¹³	32.78 ⁷²
11.9	61.181 ⁶⁵	72.73 ¹¹⁷	29.743 ⁵⁴	22.74 ¹⁰	58.122 ⁵⁵	33.50 ⁸¹
21.9	61.116 ⁹⁴	73.90 ⁸⁹	29.689 ⁸⁴	22.84 ²³	58.067 ⁸⁹	34.31 ⁸⁶
31.9	61.022 ¹¹⁵	74.79 ⁶¹	29.605 ¹⁰⁷	23.07 ³⁴	57.978 ¹¹⁵	35.17 ⁸⁶
Apr. 10.9	60.907 ¹²⁹	75.40 ³⁴	29.498 ¹²¹	23.41 ⁴¹	57.863 ¹³¹	36.03 ⁸⁰
20.8	60.778 ¹³⁵	75.74 ⁸	29.377 ¹²⁶	23.82 ⁴⁶	57.732 ¹³⁸	36.83 ⁷²
30.8	60.643 ¹³³	75.82 ¹⁸	29.251 ¹²⁴	24.28 ⁴⁹	57.594 ¹³⁷	37.55 ⁶¹
May 10.8	60.510 ¹²⁷	75.64 ⁴¹	29.127 ¹¹⁷	24.77 ⁴⁹	57.457 ¹²⁹	38.16 ⁴⁷
20.7	60.383 ¹¹⁶	75.23 ⁶⁴	29.010 ¹⁰⁴	25.26 ⁴⁹	57.328 ¹¹⁶	38.63 ³²
30.7	60.267 ⁹⁹	74.59 ⁸⁴	28.906 ⁸⁶	25.75 ⁴⁶	57.212 ⁹⁷	38.95 ¹⁷
June 9.7	60.168 ⁸¹	73.75 ¹⁰²	28.820 ⁶⁶	26.21 ⁴³	57.115 ⁷⁶	39.12 ¹
19.7	60.087 ⁵⁹	72.73 ¹¹⁷	28.754 ⁴⁵	26.64 ³⁸	57.039 ⁵¹	39.13 ¹⁴
29.6	60.028 ³⁶	71.56 ¹²⁹	28.709 ²⁰	27.02 ³³	56.988 ²⁶	38.99 ²⁹
July 9.6	59.992 ¹²	70.27 ¹³⁶	28.689 ⁵	27.35 ²⁵	56.962 ²	38.70 ⁴⁶
19.6	59.980 ¹⁵	68.91 ¹⁴⁰	28.694 ³¹	27.60 ¹⁷	56.964 ³⁰	38.24 ⁶¹
29.6	59.995 ⁴³	67.51 ¹³⁷	28.725 ⁵⁸	27.77 ⁵	56.994 ⁵⁹	37.63 ⁷⁶
Aug. 8.5	60.038 ⁷²	66.14 ¹³⁰	28.783 ⁸⁵	27.82 ⁸	57.053 ⁸⁹	36.87 ⁹¹
18.5	60.110 ¹⁰²	64.84 ¹¹⁵	28.868 ¹¹³	27.74 ²⁴	57.142 ¹¹⁹	35.96 ¹⁰⁶
28.5	60.212 ¹³⁴	63.69 ⁹⁵	28.981 ¹⁴³	27.50 ⁴¹	57.261 ¹⁵⁰	34.90 ¹²²
Sept. 7.4	60.346 ¹⁶⁵	62.74 ⁷⁰	29.124 ¹⁷³	27.09 ⁶¹	57.411 ¹⁸¹	33.68 ¹³⁶
17.4	60.511 ¹⁹⁷	62.04 ³⁹	29.297 ²⁰³	26.48 ⁸²	57.592 ²¹³	32.32 ¹⁵¹
27.4	60.708 ²²⁹	61.65 ³	29.500 ²³²	25.66 ¹⁰³	57.805 ²⁴⁴	30.81 ¹⁶³
Oct. 7.4	60.937 ²⁵⁹	61.62 ³⁵	29.732 ²⁶¹	24.63 ¹²⁵	58.049 ²⁷⁶	29.18 ¹⁷⁴
17.3	61.196 ²⁸⁶	61.97 ⁷⁵	29.993 ²⁸⁸	23.38 ¹⁴⁵	58.325 ³⁰⁵	27.44 ¹⁸¹
27.3	61.482 ³⁰⁹	62.72 ¹¹⁴	30.281 ³¹¹	21.93 ¹⁶³	58.630 ³³⁰	25.63 ¹⁸⁵
Nov. 6.3	61.791 ³²⁶	63.86 ¹⁵²	30.592 ³²⁸	20.30 ¹⁷⁶	58.960 ³⁴⁹	23.78 ¹⁸⁴
16.3	62.117 ³³⁴	65.38 ¹⁸⁶	30.920 ³³⁸	18.54 ¹⁸⁴	59.309 ³⁶¹	21.94 ¹⁷⁷
26.2	62.451 ³²⁴	67.24 ²¹⁴	31.258 ³⁴⁰	16.70 ¹⁸⁷	59.670 ³⁶⁴	20.17 ¹⁶⁵
Dec. 6.2	62.785 ³²⁴	69.38 ²³⁶	31.598 ³³³	14.83 ¹⁸⁴	60.034 ³⁵⁷	18.52 ¹⁴⁷
16.2	63.109 ³⁰⁴	71.74 ²⁵⁰	31.931 ³¹⁴	12.99 ¹⁷⁴	60.391 ³⁴⁰	17.05 ¹²⁵
26.1	63.413 ²⁷⁵	74.24 ²⁵⁶	32.245 ²⁸⁷	11.25 ¹⁶⁰	60.731 ³¹²	15.80 ⁹⁸
36.1	63.688	76.80	32.532	09.65	61.043	14.82
Mean Place	59.824	66.64	28.150	25.59	56.264	34.24
Sec δ , Tan δ	1.031	—0.250	1.016	+0.180	1.095	+0.447
a, a'	+2.9	—16.3	+3.2	—16.3	+3.4	—16.5
b, b'	+0.01	—0.6	—0.01	—0.6	—0.02	—0.6
Authority and Catalogue No.	A.N.	593	A.N.	594	B.J.	597

APPARENT PLACES OF STARS, 1931.

419

AT UPPER TRANSIT AT GREENWICH.

Name	v Argus		v Ursæ Majoris		μ Leonis	
	3·15	Fo	3·89	Fo	4·10	Ko
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 09 ^m 45	[°] -64 ['] 44	^h 09 ^m 46	[°] +59 ['] 21	^h 09 ^m 48	[°] +26 ['] 19
Jan. 1·1	23·69	45·68	08·045	44·18	51·456	56·18
11·1	24·07	49·16	08·506	45·09	51·755	55·47
21·1	24·36	52·89	08·898	46·44	52·011	55·07
31·0	24·56	56·76	09·208	48·17	52·218	54·99
Feb. 10·0	24·66	60·67	09·429	50·20	52·370	55·20
17	—	386·17	128	225	98	47
19·9	24·66	64·53	09·557	52·45	52·468	55·67
Mar. 1·9	24·58	68·23	09·593	54·81	52·512	56·35
11·9	24·41	71·71	09·542	57·17	52·506	57·18
21·9	24·16	74·88	09·414	59·43	52·456	58·12
31·9	23·85	77·69	09·220	61·50	52·371	59·10
Apr. 10·9	23·49	80·08	08·975	63·29	52·258	60·05
20·8	23·10	82·02	08·695	64·73	52·128	60·94
30·8	22·68	83·46	08·394	65·77	51·990	61·73
May 10·8	22·24	84·39	08·087	66·39	51·850	62·38
20·7	21·80	84·80	07·789	66·56	51·717	62·88
	43	12	278	28	121	33
30·7	21·37	84·68	07·511	66·28	51·596	63·21
June 9·7	20·96	84·03	07·264	65·57	51·493	63·36
19·7	20·58	82·88	07·055	64·44	51·411	63·32
29·6	20·24	81·26	06·889	62·92	51·352	63·11
July 9·6	19·95	79·23	06·774	61·08	51·319	62·72
	23	239	61	215	6	56
19·6	19·72	76·84	06·713	58·93	51·313	62·16
29·6	19·55	74·17	06·707	56·52	51·335	61·43
Aug. 8·5	19·45	71·29	06·757	53·91	51·387	60·53
18·5	19·44	68·31	06·865	51·15	51·469	59·48
28·5	19·50	65·33	07·031	48·28	51·582	58·27
	15	288	223	293	144	137
Sept. 7·4	19·65	62·45	07·254	45·35	51·726	56·90
17·4	19·89	59·80	07·534	42·42	51·902	55·39
27·4	20·21	57·47	07·870	39·54	52·112	53·75
Oct. 7·4	20·61	55·57	08·261	36·77	52·355	51·98
17·3	21·08	54·19	08·702	34·17	52·630	50·13
	52	80	487	237	304	190
27·3	21·60	53·39	09·189	31·80	52·934	48·23
Nov. 6·3	22·17	53·23	09·715	29·71	53·265	46·31
16·3	22·77	53·72	10·272	27·97	53·617	44·41
26·2	23·37	54·88	10·847	26·63	53·982	42·61
Dec. 6·2	23·96	56·67	11·426	25·74	54·352	40·95
	55	236	568	41	364	145
16·2	24·51	59·03	11·994	25·33	54·716	39·50
26·1	25·01	61·90	12·535	25·43	55·064	38·29
36·1	25·45	65·19	13·030	26·01	55·384	37·36
	44	329	495	58	320	93
Mean Place	22·630	64·89	05·935	51·66	50·581	58·03
Sec δ, Tan δ	2·344	-2·120	1·962	+1·688	1·116	+0·495
a, a'	+1·5	-16·7	+4·3	-16·7	+3·4	-16·9
b, b'	+0·12	-0·6	-0·09	-0·6	-0·03	-0·5
Authority and Catalogue No.	B.J.	600	B.J.	601	A.N.	603

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name	π Leonis		α Leonis (<i>Regulus</i>)		η Velorum	
Mag. Spect.	4.89	Ma	1.34	B8	4.09	A2
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 09 ^m 56	[°] +8 ['] 22	^h 10 ^m 04	[°] +12 ['] 17	^h 10 ^m 11	[°] -41 ['] 46
Jan. 1.1	34 ^s .699	36 ^s .05	42 ^s .545	79 ^s .61	50 ^s .528	30 ^s .70
11.1	34 ^s .976	34 ^s .43	42 ^s .832	78 ^s .14	50 ^s .837	33 ^s .90
21.1	35 ^s .214	33 ^s .01	43 ^s .080	76 ^s .90	51 ^s .097	37 ^s .26
31.1	35 ^s .408	31 ^s .84	43 ^s .284	75 ^s .93	51 ^s .302	40 ^s .70
Feb. 10.0	35 ^s .553	30 ^s .93	43 ^s .440	75 ^s .23	51 ^s .448	44 ^s .12
20.0	35 ^s .648†	30 ^s .27	43 ^s .545	74 ^s .80	51 ^s .535	47 ^s .44
Mar. 1.9	35 ^s .694	29 ^s .85	43 ^s .601	74 ^s .62	51 ^s .565	50 ^s .59
11.9	35 ^s .696	29 ^s .66	43 ^s .611	74 ^s .65	51 ^s .541	53 ^s .50
21.9	35 ^s .659	29 ^s .66	43 ^s .581	74 ^s .87	51 ^s .470	56 ^s .12
31.9	35 ^s .589	29 ^s .82	43 ^s .517	75 ^s .23	51 ^s .360	58 ^s .41
Apr. 10.9	35 ^s .496	30 ^s .12	43 ^s .428	75 ^s .71	51 ^s .217	60 ^s .33
20.8	35 ^s .386	30 ^s .50	43 ^s .321	76 ^s .24	51 ^s .050	61 ^s .86
30.8	35 ^s .268	30 ^s .95	43 ^s .204	76 ^s .80	50 ^s .867	62 ^s .97
May 10.8	35 ^s .149	31 ^s .44	43 ^s .084	77 ^s .36	50 ^s .675	63 ^s .66
20.8	35 ^s .034	31 ^s .95	42 ^s .968	77 ^s .91	50 ^s .480	63 ^s .92
30.7	34 ^s .929	32 ^s .47	42 ^s .861	78 ^s .42	50 ^s .290	63 ^s .74
June 9.7	34 ^s .838	32 ^s .98	42 ^s .766	78 ^s .88	50 ^s .109	63 ^s .15
19.7	34 ^s .763	33 ^s .46	42 ^s .688	79 ^s .27	49 ^s .942	62 ^s .16
29.7	34 ^s .708	33 ^s .91	42 ^s .629	79 ^s .59	49 ^s .794	60 ^s .80
July 9.6	34 ^s .675	34 ^s .30	42 ^s .590	79 ^s .82	49 ^s .669	59 ^s .11
19.6	34 ^s .665	34 ^s .62	42 ^s .574	79 ^s .96	49 ^s .571	57 ^s .15
29.6	34 ^s .678	34 ^s .86	42 ^s .582	79 ^s .98	49 ^s .504	54 ^s .96
Aug. 8.5	34 ^s .717	34 ^s .99	42 ^s .614	79 ^s .88	49 ^s .473	52 ^s .64
18.5	34 ^s .783	34 ^s .98	42 ^s .673	79 ^s .63	49 ^s .480	50 ^s .25
28.5	34 ^s .877	34 ^s .82	42 ^s .760	79 ^s .21	49 ^s .529	47 ^s .88
Sept. 7.5	34 ^s .999	34 ^s .47	42 ^s .876	78 ^s .62	49 ^s .623	45 ^s .63
17.4	35 ^s .152	33 ^s .92	43 ^s .023	77 ^s .83	49 ^s .763	43 ^s .58
27.4	35 ^s .337	33 ^s .15	43 ^s .202	76 ^s .84	49 ^s .951	41 ^s .84
Oct. 7.4	35 ^s .553	32 ^s .16	43 ^s .414	75 ^s .64	50 ^s .187	40 ^s .48
17.4	35 ^s .800	30 ^s .93	43 ^s .657	74 ^s .23	50 ^s .467	39 ^s .59
27.3	36 ^s .076	29 ^s .48	43 ^s .931	72 ^s .64	50 ^s .788	39 ^s .21
Nov. 6.3	36 ^s .378	27 ^s .84	44 ^s .232	70 ^s .88	51 ^s .143	39 ^s .39
16.3	36 ^s .700	26 ^s .03	44 ^s .555	69 ^s .00	51 ^s .524	40 ^s .15
26.2	37 ^s .036	24 ^s .12	44 ^s .894	67 ^s .06	51 ^s .921	41 ^s .46
Dec. 6.2	37 ^s .377	22 ^s .15	45 ^s .239	65 ^s .10	52 ^s .321	43 ^s .31
16.2	37 ^s .714	20 ^s .19	45 ^s .581	63 ^s .20	52 ^s .712	45 ^s .63
26.2	38 ^s .036	18 ^s .31	45 ^s .911	61 ^s .41	53 ^s .082	48 ^s .37
36.1	38 ^s .334	16 ^s .56	46 ^s .217	59 ^s .79	53 ^s .418	51 ^s .43
Mean Place	34 ^s .081	33 ^s .77	41 ^s .924	78 ^s .68	50 ^s .147	46 ^s .20
Sec δ , Tan δ	1 ^s .011	+0 ^s .147	1 ^s .024	+0 ^s .218	1 ^s .341	-0 ^s .893
a, a'	+3 ^s .2	-17 ^s .2	+3 ^s .2	-17 ^s .6	+2 ^s .5	-17 ^s .9
b, b'	-0 ^s .01	-0 ^s .5	-0 ^s .01	-0 ^s .5	+0 ^s .05	-0 ^s .5
Authority and Catalogue No.	B.J.	612	B.J.	617	B.J.	619

† First transit, Feb. 20.

APPARENT PLACES OF STARS, 1931.

421

AT UPPER TRANSIT AT GREENWICH.

Name Mag. Spect.	22 Sextantis		q Carinae		γ ¹ Leonis	
	5.40	Fo	3.44	K5	2.61	Ko
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 10 ^m 14	[°] —7 ['] 43	^h 10 ^m 14	[°] —60 ['] 58	^h 10 ^m 16	[°] +20 ['] 11
Jan. 1.1	12.442 ^s 281	18.66 ^s 232	47.16 ^s 41	54.14 ^s 328	10.914 ^s 306	26.51 ^s 118
11.1	12.723 242	20.98 224	47.57 33	57.42 358	11.220 269	25.33 88
21.1	12.965 200	23.22 209	47.90 25	61.00 377	11.489 224	24.45 57
31.1	13.165 152	25.31 190	48.15 17	64.77 385	11.713 175	23.88 26
Feb. 10.0	13.317 105	27.21 167	48.32 8	68.62 384	11.888 123	23.62 3
20.0	13.422 57	28.88 143	48.40 24	72.46 374	12.011 72	23.65 29
Mar. 1.9	13.479 13	30.31 117	48.40 7	76.20 355	12.083 23	23.94 49
11.9	13.492 25	31.48 93	48.33 15	79.75 329	12.106 19	24.43 66
21.9	13.467 58	32.41 68	48.18 20	83.04 298	12.087 56	25.09 76
31.9	13.409 83	33.09 43	47.98 26	86.02 259	12.031 85	25.85 81
Apr. 10.9	13.326 101	33.52 22	47.72 30	88.61 217	11.946 105	26.66 82
20.8	13.225 112	33.74 1	47.42 32	90.78 171	11.841 117	27.48 79
30.8	13.113 116	33.75 17	47.10 35	92.49 122	11.724 122	28.27 72
May 10.8	12.997 115	33.58 35	46.75 35	93.71 72	11.602 121	28.99 61
20.8	12.882 110	33.23 51	46.40 36	94.43 20	11.481 114	29.60 50
30.7	12.772 99	32.72 65	46.04 34	94.63 32	11.367 102	30.10 37
June 9.7	12.673 87	32.07 77	45.70 33	94.31 82	11.265 87	30.47 23
19.7	12.586 70	31.30 88	45.37 30	93.49 129	11.178 68	30.70 9
29.7	12.516 52	30.42 94	45.07 27	92.20 173	11.110 48	30.79 8
July 9.6	12.464 32	29.48 98	44.80 22	90.47 211	11.062 26	30.71 23
19.6	12.432 10	28.50 99	44.58 18	88.36 243	11.036 2	30.48 40
29.6	12.422 14	27.51 95	44.40 12	85.93 267	11.034 24	30.08 56
Aug. 8.5	12.436 41	26.56 88	44.28 5	83.26 283	11.058 51	29.52 72
18.5	12.477 68	25.68 75	44.23 2	80.43 288	11.109 80	28.80 91
28.5	12.545 98	24.93 56	44.25 9	77.55 282	11.189 110	27.89 109
Sept. 7.5	12.643 131	24.37 35	44.34 16	74.73 267	11.299 142	26.80 126
17.4	12.774 164	24.02 8	44.50 25	72.06 239	11.441 175	25.54 145
27.4	12.938 198	23.94 23	44.75 32	69.67 203	11.616 209	24.09 163
Oct. 7.4	13.136 231	24.17 55	45.07 38	67.64 155	11.825 244	22.46 176
17.4	13.367 264	24.72 90	45.45 44	66.09 102	12.069 277	20.70 189
27.3	13.631 291	25.62 124	45.89 50	65.07 41	12.346 306	18.81 199
Nov. 6.3	13.922 314	26.86 155	46.39 53	64.66 23	12.652 330	16.82 202
16.3	14.236 331	28.41 183	46.92 55	64.89 87	12.982 348	14.80 201
26.2	14.567 337	30.24 207	47.47 55	65.76 151	13.330 358	12.79 193
Dec. 6.2	14.904 335	32.31 223	48.02 53	67.27 209	13.688 358	10.86 181
16.2	15.239 322	34.54 234	48.55 49	69.36 263	14.046 346	09.05 160
26.2	15.561 299	36.88 235	49.04 45	71.99 307	14.392 324	07.45 137
36.1	15.860	39.23	49.49	75.06	14.716	06.08
Mean Place	12.024	25.00	46.615	73.50	10.248	28.17
Sec δ, Tan δ	1.009	—0.136	2.062	—1.803	1.066	+0.368
a, a'	+3.0	—17.9	+2.0	—18.0	+3.3	—18.0
b, b'	+0.01	—0.4	+0.11	—0.4	—0.02	—0.4
Authority and Catalogue No.	N.A.	624	N.A.	625	N.A.	627

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name	μ Ursæ Majoris			μ Hydræ			α Antliæ		
	Mag.	Spect.		Mag.	Spect.		Mag.	Spect.	
Mean Solar Date	3.21		K5	4.06		K5	4.42		K5
	R.A.		Dec.	R.A.		Dec.	R.A.		Dec.
	^h 10	^m 18	[°] +41 ['] 50	^h 10	^m 22	[°] -16 ['] 28	^h 10	^m 23	[°] -30 ['] 42
Jan. 1.2	14.617	369	42.95	45.418	287	51.72	59.749	300	43.88
11.1	14.986	325	42.75	45.705	250	54.32	60.049	258	46.83
21.1	15.311	271	42.98	45.955	206	56.92	60.307	211	49.89
31.1	15.582	211	43.61	46.161	159	59.43	60.518	160	52.97
Feb. 10.0	15.793	147	44.61	46.320	110	61.81	60.678	107	55.99
20.0	15.940	83	45.92	46.430	62	63.99	60.785	56	58.87
Mar. 1.9	16.023	22	47.46	46.492	17	65.94	60.841	8	61.57
11.9	16.045	34	49.14	46.509	22	67.64	60.849	35	64.02
21.9	16.011	82	50.89	46.487	56	69.07	60.814	72	66.20
31.9	15.929	120	52.62	46.431	83	70.22	60.742	100	68.07
Apr. 10.9	15.809	148	54.24	46.348	102	71.10	60.642	123	69.60
20.9	15.661	167	55.69	46.246	114	71.71	60.519	138	70.80
30.8	15.494	175	56.92	46.132	121	72.04	60.381	146	71.64
May 10.8	15.319	175	57.87	46.011	121	72.12	60.235	149	72.12
20.8	15.144	167	58.52	45.890	118	71.95	60.086	146	72.24
30.7	14.977	152	58.85	45.772	109	71.54	59.940	139	72.01
June 9.7	14.825	132	58.86	45.663	98	70.91	59.801	128	71.45
19.7	14.693	110	58.54	45.565	84	70.08	59.673	114	70.56
29.7	14.583	81	57.90	45.481	66	69.07	59.559	94	69.37
July 9.6	14.502	52	56.95	45.415	47	67.92	59.465	73	67.93
19.6	14.450	19	55.73	45.368	25	66.66	59.392	48	66.28
29.6	14.431	14	54.24	45.343	—	65.33	59.344	20	64.46
Aug. 8.6	14.445	50	52.51	45.343	26	63.99	59.324	10	62.54
18.5	14.495	87	50.58	45.369	56	62.68	59.334	45	60.60
28.5	14.582	125	48.46	45.425	87	61.47	59.379	83	58.70
Sept. 7.5	14.707	165	46.19	45.512	122	60.42	59.462	121	56.92
17.4	14.872	205	43.79	45.634	157	59.59	59.583	163	55.35
27.4	15.077	247	41.31	45.791	192	59.04	59.746	204	54.07
Oct. 7.4	15.324	288	38.79	45.983	229	58.81	59.950	244	53.14
17.4	15.612	327	36.27	46.212	263	58.95	60.194	283	52.63
27.3	15.939	362	33.80	46.475	294	59.49	60.477	316	52.59
Nov. 6.3	16.301	392	31.44	46.769	318	60.43	60.793	342	53.04
16.3	16.693	414	29.26	47.087	335	61.77	61.135	359	53.99
26.3	17.107	427	27.31	47.422	344	63.47	61.494	367	55.43
Dec. 6.2	17.534	427	25.65	47.766	342	65.49	61.861	363	57.32
16.2	17.961	414	24.35	48.108	329	67.78	62.224	349	59.61
26.2	18.375	390	23.44	48.437	307	70.26	62.573	322	62.22
36.1	18.765	390	22.96	48.744	—	72.85	62.895	—	65.08
Mean Place	13.523	—	49.86	45.088	—	60.46	59.466	—	56.63
Sec δ , Tan δ	1.342	—	+0.896	1.043	—	-0.296	1.163	—	-0.594
a, a'	+3.6	—	-18.1	+2.9	—	-18.3	+2.7	—	-18.3
b, b'	-0.05	—	-0.4	+0.02	—	-0.4	+0.04	—	-0.4
Authority and Catalogue No.	B.J.	—	628	B.J.	—	633	B.J.	—	636

APPARENT PLACES OF STARS, 1931.

423

AT UPPER TRANSIT AT GREENWICH.

Name	ρ Leonis		34 Sextantis		θ Argus	
	3·85	Bop	6·63	F5	3·03	Bo
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ₁₀ ^m ₂₉	[°] ₊₉ ['] ₃₉	^h ₁₀ ^m ₃₉	[°] ₊₃ ['] ₅₆	^h ₁₀ ^m ₄₀	[°] ₋₆₄ ['] ₀₁
Jan. 1·2	^s _{11·210}	["] _{44·82}	^s _{04·087}	["] _{40·87}	^s _{29·66}	["] _{36·68}
11·1	₂₉₉	₁₆₉	₃₀₀	₁₉₄	₄₈	₃₀₆
21·1	₂₆₅	₁₄₆	₂₆₇	₁₇₆	₄₁	₃₄₂
31·1	₂₂₃	₁₂₀	₂₂₇	₁₅₃	₃₃	₃₆₇
Feb. 10·1	₁₇₈	₉₃	₁₈₂	₁₂₈	₂₃	₃₈₂
	₁₂₈	₆₅	₁₃₄	₁₀₂	₁₅	₃₈₇
20·0	_{12·303}	_{38·89}	_{05·197}	_{33·34}	_{31·26}	_{54·52}
Mar. 2·0	₈₀	₃₈	₈₈	₇₆	₆	₃₈₄
	_{28 12·383}	_{38·51}	_{05·285}	_{32·58}	_{31·32}	_{58·36}
11·9	₃₅	₁₅	₄₄	₅₀	₃	₃₇₁
21·9	₆	₇	₂	₂₇	₁₁	₃₅₁
31·9	₄₁	₂₄	₃₂	₇	₁₇	₃₂₃
	₆₉	₃₇	₆₀	₁₀	₂₄	₂₉₀
Apr. 10·9	_{12·302}	_{39·04}	_{05·239}	_{31·84}	_{30·77}	_{71·71}
20·9	₈₉	₄₇	₈₂	₂₅	₂₉	₂₅₁
30·8	₁₀₂	₅₄	₉₅	₃₆	₃₂	₂₀₈
May 10·8	₁₁₀	₅₈	₁₀₄	₄₅	₃₆	₁₆₀
20·8	₁₁₀	₅₆	₁₀₅	₅₀	₃₈	₁₁₁
	₁₀₅	₅₆	₁₀₄	₅₄	₃₉	₆₀
30·8	_{11·786}	_{41·75}	_{04·749}	_{33·94}	_{29·03}	_{79·61}
June 9·7	₉₇	₅₂	₉₇	₅₇	₃₉	₈
19·7	₈₅	₄₈	₈₇	₅₈	₃₈	₄₄
29·7	₇₀	₄₂	₇₄	₅₆	₃₅	₉₆
July 9·6	₅₃	₃₄	₅₉	₅₃	₃₄	₁₄₁
	₃₅	₂₅	₄₂	₄₈	₂₉	₁₈₅
19·6	_{11·446}	_{43·76}	_{04·390}	_{36·66}	_{27·28}	_{75·03}
29·6	₁₃	₁₄	₂₃	₄₀	₂₄	₂₂₂
Aug. 8·6	₁₀	₂	₁	₃₁	₁₈	₂₅₁
18·5	₃₅	₁₃	₂₄	₁₉	₁₂	₂₇₄
28·5	₆₁	₂₉	₄₉	₃	₄	₂₈₅
	₉₀	₄₈	₇₈	₁₅	₄	₂₈₈
Sept. 7·5	_{11·629}	_{43·02}	_{04·517}	_{37·44}	_{26·74}	_{61·83}
17·5	₁₂₂	₆₉	₁₁₀	₃₆	₁₂	₂₇₉
27·4	₁₅₅	₉₁	₁₄₂	₆₀	₂₁	₂₅₈
Oct. 7·4	₁₈₉	₁₁₃	₁₇₇	₈₄	₃₀	₂₂₇
17·4	₂₂₃	₁₃₆	₂₁₄	₁₁₀	₃₈	₁₈₅
	₂₅₆	₁₅₇	₂₄₆	₁₃₆	₄₅	₁₃₆
27·3	_{12·574}	_{37·36}	_{05·406}	_{33·18}	_{28·20}	_{50·98}
Nov. 6·3	₂₈₇	₁₇₅	₂₇₉	₁₆₀	₅₂	₇₈
16·3	₃₁₂	₁₉₂	₃₀₅	₁₈₁	₅₇	₁₅
26·3	₃₃₂	₂₀₁	₃₂₆	₁₉₈	₅₉	₄₈
Dec. 6·2	₃₄₃	₂₀₆	₃₃₈	₂₀₈	₆₁	₁₁₃
	₃₄₄	₂₀₄	₃₄₂	₂₁₄	₅₉	₁₇₅
16·2	_{14·192}	_{27·58}	_{06·996}	_{23·57}	_{31·08}	_{53·41}
26·2	₃₃₅	₁₉₆	₃₃₃	₂₁₁	₅₇	₂₃₁
36·2	₃₁₇	₁₈₂	₃₁₆	₂₀₃	₅₂	₂₈₁
	_{14·844}	_{23·80}	_{07·645}	_{19·43}	_{32·17}	_{58·53}
Mean Place	_{10·732}	_{44·04}	_{03·709}	_{38·72}	_{29·432}	_{56·86}
Sec δ ; Tan δ	_{1·014}	_{+0·170}	_{1·002}	_{+0·069}	_{2·284}	_{-2·053}
a, a'	_{+3·2}	_{-18·5}	_{+3·1}	_{-18·8}	_{+2·1}	_{-18·8}
b, b'	_{-0·01}	_{-0·4}	_{0·00}	_{-0·3}	_{+0·13}	_{-0·3}
Authority and Catalogue No.	_{A.N.}	₆₄₁	_{N.A.}	₆₅₄	_{B.J.}	₆₅₆

§ Transit, Mar. 1.

† First transit, Mar. 2.

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name	η Argus		μ Argus		ι Leonis	
	Var.	Pec.	2.86	G5	5.27	Ao
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
Mean Solar Date	^h 10	^m 42	^h 10	^m 43	^h 10	^m 45
		[°] —59		[°] —49		[°] +10
		['] 18		['] 03		['] 54
Jan. 1.2	22.884	57.35	47.949	00.85	38.271	38.73
11.1	23.316	60.42	48.318	03.92	38.581	37.03
21.1	23.687	63.81	48.637	07.24	38.859	35.56
31.1	23.987	67.45	48.900	10.74	39.098	34.37
Feb. 10.1	24.210	71.21	49.102	14.32	39.291	33.47
20.0	24.355	75.01	49.239	17.88	39.436	32.86
Mar. 2.0	24.421	78.76	49.313	21.34	39.534	32.53
11.9	24.414	82.36	49.328	24.63	39.585	32.45
21.9	24.337	85.75	49.288	27.68	39.594	32.60
31.9	24.201	88.87	49.200	30.45	39.568	32.92
Apr. 10.9	24.012	91.64	49.072	32.87	39.512	33.37
20.9	23.779	94.02	48.911	34.92	39.433	33.92
30.8	23.512	95.98	48.723	36.56	39.339	34.53
May 10.8	23.219	97.48	48.518	37.77	39.236	35.16
20.8	22.910	98.50	48.301	38.53	39.130	35.78
30.8	22.592	99.01	48.080	38.83	39.025	36.37
June 9.7	22.275	99.01	47.861	38.67	38.926	36.91
19.7	21.966	98.52	47.649	38.07	38.837	37.39
29.7	21.673	97.55	47.450	37.04	38.760	37.79
July 9.7	21.405	96.12	47.269	35.61	38.698	38.10
19.6	21.170	94.29	47.114	33.84	38.653	38.30
29.6	20.975	92.11	46.989	31.76	38.627	38.37
Aug. 8.6	20.831	89.64	46.900	29.46	38.622	38.31
18.5	20.741	86.98	46.852	27.00	38.642	38.10
28.5	20.715	84.21	46.851	24.48	38.687	37.71
Sept. 7.5	20.757	81.44	46.901	22.00	38.761	37.13
17.5	20.872	78.77	47.006	19.64	38.866	36.35
27.4	21.062	76.31	47.168	17.52	39.005	35.35
Oct. 7.4	21.325	74.16	47.389	15.71	39.179	34.12
17.4	21.660	72.44	47.665	14.34	39.388	32.68
27.4	22.059	71.21	47.992	13.45	39.633	31.02
Nov. 6.3	22.514	70.55	48.365	13.11	39.911	29.19
16.3	23.013	70.50	48.774	13.36	40.217	27.20
26.3	23.538	71.08	49.208	14.20	40.545	25.13
Dec. 6.2	24.075	72.30	49.653	15.62	40.888	23.01
16.2	24.607	74.10	50.096	17.58	41.235	20.92
26.2	25.114	76.45	50.523	20.03	41.577	18.93
36.2	25.582	79.29	50.918	22.89	41.902	17.09
Mean Place	22.714	76.74	47.827	18.17	37.860	38.96
Sec δ , Tan δ	1.960	—1.686	1.526	—1.153	1.018	+0.193
a, a'	+2.3	—18.9	+2.6	—18.9	+3.2	—19.0
b, b'	+0.11	—0.3	+0.07	—0.3	—0.01	—0.3
Authority and Catalogue No.	N.A.	658	B.J.	660	B.J.	662

APPARENT PLACES OF STARS, 1931.

425

AT UPPER TRANSIT AT GREENWICH.

Name		ν Hydræ		ι Antliæ		δ Leonis	
Mag. Spect.		3·32	Ko	4·70	Ko	5·05	Ko
Mean Solar Date		R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
		^h 10 ^m 46	[°] —15 ['] 49	^h 10 ^m 53	[°] —36 ['] 45	^h 10 ^m 56	[°] +3 ['] 58
Jan.	1·2	13°293	47°37	29°924	44°51	60°105	79°77
	11·1	13°596	49°92	30°259	47°41	60°415	77°79
	21·1	13°865	52°46	30°556	50°50	60°695	75°99
	31·1	14°093	54°93	30°807	53°70	60°937	74°42
Feb.	10·1	14°276	57°27	31°006	56°90	61°135	73°10
	20·0	14°412	59°43	31°151	60°03	61°288	72°05
Mar.	2·0	14°500	61°37	31°244	63°04	61°394	71°27
	11·9	14°544	63°07	31°286	65°85	61°456	70°75
	21·9	14°548	64°51	31°281	68°42	61°476	70°47
	31·9	14°517	65°68	31°236	70°70	61°461	70°40
Apr.	10·9	14°457	66°59	31°156	72°67	61°417	70°52
	20·9	14°375	67°23	31°049	74°29	61°349	70°77
	30·8	14°277	67°62	30°920	75°56	61°264	71°14
May	10·8	14°169	67°76	30°777	76°45	61°170	71°60
	20·8	14°057	67°66	30°625	76°96	61°070	72°12
June	30·8	13°945	67°34	30°468	77°09	60°970	72°67
	9·7	13°837	66°81	30°313	76°84	60°873	73°25
	19·7	13°737	66°09	30°163	76°22	60°783	73°82
	29·7	13°647	65°20	30°023	75°26	60°703	74°37
July	9·7	13°571	64°17	29°896	73°98	60°635	74°89
	19·6	13°511	63°02	29°788	72°43	60°583	75°35
Aug.	29·6	13°470	61°81	29°702	70°65	60°548	75°74
	8·6	13°451	60°57	29°643	68°70	60°532	76°02
	18·5	13°456	59°35	29°615	66°65	60°539	76°18
	28·5	13°490	58°22	29°623	64°59	60°571	76°19
Sept.	7·5	13°555	57°23	29°670	62°58	60°631	76°02
	17·5	13°654	56°43	29°760	60°72	60°723	75°63
	27·4	13°789	55°89	29°897	59°10	60°849	75°02
Oct.	7·4	13°962	55°66	30°080	57°80	61°010	74°16
	17·4	14°173	55°78	30°310	56°88	61°207	73°03
Nov.	27·4	14°420	56°26	30°586	56°42	61°441	71°66
	6·3	14°701	57°14	30°900	56°45	61°709	70°04
	16·3	15°011	58°41	31°249	57°01	62°006	68°21
	26·3	15°342	60°03	31°622	58°09	62°327	66°21
Dec.	6·2	15°686	61°97	32°010	59°66	62°663	64°10
	16·2	16°032	64°17	32°399	61°70	63°006	61°93
	26·2	16°371	66°57	32°777	64°13	63°345	59°78
	36·2	16°690	69°09	33°134	66°89	63°669	57°71
Mean Place		13°096	55°53	29°867	58°73	59°821	78°24
Sec δ, Tan δ		1°039	—0°284	1°248	—0°747	1°002	+0°070
a, a'		+3°0	—19°0	+2°8	—19°2	+3°1	—19°3
b, b'		+0°02	—0°3	+0°05	—0°3	0°00	—0°3
Authority and Catalogue No.		A.N.	663	A.N.	668	N.A.	672

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name	β Ursæ Majoris			α Ursæ Majoris (<i>Dubhe</i>)			χ Leonis		
Mag. Spect.	2.44		Ao	1.95		Ko	4.66		Fo
Mean Solar Date	R.A.		Dec.	R.A.		Dec.	R.A.		Dec.
	^h 10	^m 57	[°] +56 ['] 44	^h 10	^m 59	[°] +62 ['] 06	^h 11	^m 01	[°] +7 ['] 42
Jan. 1.2	42.839	498	57.83	30.88	57	73.11	27.780	314	33.96
11.2	43.337	452	57.83	31.45	52	73.28	28.094	285	32.09
21.1	43.789	392	58.37	31.97	44	74.01	28.379	247	30.43
31.1	44.181	322	59.42	32.41	37	75.27	28.626	205	29.03
Feb. 10.1	44.503	242	60.92	32.78	27	76.99	28.831	158	27.90
20.0	44.745	160	62.81	33.05	18	79.09	28.989	111	27.06
Mar. 2.0	44.905	78	64.98	33.23	8	81.47	29.100	66	26.51
11.9	44.983	1	67.34	33.31	1	84.02	29.166	25	26.21
21.9	44.982	72	69.78	33.30	9	86.63	29.191	12	26.16
31.9	44.910	133	72.18	33.21	16	89.19	29.179	42	26.31
Apr. 10.9	44.777	183	74.46	33.05	23	91.59	29.137	66	26.62
20.9	44.594	221	76.51	32.82	27	93.73	29.071	84	27.05
30.9	44.373	247	78.26	32.55	31	95.54	28.987	94	27.57
May 10.8	44.126	261	79.65	32.24	32	96.96	28.893	101	28.14
20.8	43.865	264	80.64	31.92	33	97.94	28.792	101	28.74
30.8	43.601	257	81.19	31.59	32	98.45	28.691	98	29.33
June 9.7	43.344	242	81.30	31.27	30	98.47	28.593	91	29.91
19.7	43.102	220	80.95	30.97	28	98.01	28.502	83	30.45
29.7	42.882	191	80.17	30.69	25	97.09	28.419	70	30.93
July 9.7	42.691	156	78.96	30.44	20	95.71	28.349	55	31.34
19.6	42.535	118	77.34	30.24	16	93.92	28.294	39	31.66
29.6	42.417	75	75.37	30.08	10	91.75	28.255	18	31.88
Aug. 8.6	42.342	29	73.08	29.98	5	89.24	28.237	3	31.98
18.6	42.313	20	70.50	29.93	7	86.45	28.240	28	31.93
28.5	42.333	73	67.68	29.93	7	83.42	28.268	56	31.72
Sept. 7.5	42.406	128	64.68	30.00	14	80.21	28.324	87	31.32
17.5	42.534	184	61.54	30.14	20	76.88	28.411	121	30.71
27.4	42.718	243	58.32	30.34	27	73.49	28.532	157	29.87
Oct. 7.4	42.961	302	55.09	30.61	33	70.11	28.689	194	28.80
17.4	43.263	359	51.90	30.94	41	66.80	28.883	230	27.48
27.4	43.622	412	48.82	31.35	46	63.63	29.113	265	25.94
Nov. 6.3	44.034	460	45.94	31.81	52	60.69	29.378	296	24.18
16.3	44.494	499	43.32	32.33	56	58.05	29.674	320	22.24
26.3	44.993	525	41.03	32.89	60	55.79	29.994	338	20.17
Dec. 6.3	45.518	539	39.15	33.49	61	53.97	30.332	344	18.02
16.2	46.057	537	37.74	34.10	61	52.65	30.676	342	15.86
26.2	46.594	516	36.85	34.71	58	51.89	31.018	328	13.75
36.2	47.110		36.49	35.29		51.69	31.346		11.77
Mean Place	41.391		69.94	29.098		86.12	27.483		33.78
Sec δ , Tan δ	1.824		+1.525	2.139		+1.891	1.009		+0.135
a, a'	+3.6		-19.3	+3.7		-19.3	+3.1		-19.4
b, b'	-0.10		-0.3	-0.12		-0.3	-0.01		-0.3
Authority and Catalogue No.	B.J.		674	B.J.		675	B.J.		677

APPARENT PLACES OF STARS, 1931.

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AT UPPER TRANSIT AT GREENWICH.

Name	ψ Ursæ Majoris		β Crateris		δ Leonis	
	3.15	Ko	4.52	A2	2.58	A3
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ^m 11 05	[°] ['] +44 51	^h ^m 11 08	[°] ['] -22 26	^h ^m 11 10	[°] ['] +20 53
Jan. 1.2	48.360 ⁸ 412	73.30 ["] 54	15.688 ⁸ 321	45.81 ["] 264	26.846 ⁸ 335	63.03 ["] 146
11.2	48.772 ⁴¹²	72.76 ⁵⁴	16.009 ³²¹	48.45 ²⁶⁴	27.181 ³³⁵	61.57 ¹⁴⁶
21.1	49.148 ³⁷⁶	72.71 ⁵	16.299 ²⁹⁰	51.16 ²⁷¹	27.489 ³⁰⁸	60.43 ¹¹⁴
31.1	49.477 ³²⁹	73.15 ⁴⁴	16.550 ²⁵¹	53.87 ²⁶¹	27.758 ²⁶⁹	59.65 ⁷⁸
Feb. 10.1	49.751 ²⁷⁴	74.03 ⁸⁸	16.756 ²⁰⁶	56.51 ²⁷⁴	27.984 ²²⁶	59.23 ⁴²
	212	128	159	250	178	8
20.0	49.963 ¹⁴⁷	75.31 ¹⁶⁰	16.915 ¹¹²	59.01 ²³²	28.162 ¹²⁸	59.15 ²³
Mar. 2.0	50.110 ⁸⁴	76.91 ¹⁸³	17.027 ⁶⁶	61.33 ²¹⁰	28.290 ⁸⁰	59.38 ⁵¹
11.9	50.194 ²³	78.74 ¹⁹⁷	17.093 ²⁴	63.43 ¹⁸⁶	28.370 ³⁵	59.89 ⁷³
21.9	50.217 ³²	80.71 ²⁰²	17.117 ¹³	65.29 ¹⁵⁹	28.405 ⁵	60.62 ⁸⁸
31.9	50.185 ⁸⁰	82.73 ¹⁹⁸	17.104 ⁴⁴	66.88 ¹³¹	28.400 ³⁹	61.50 ⁹⁹
Apr. 10.9	50.105 ¹¹⁷	84.71 ¹⁸⁴	17.060 ⁷⁰	68.19 ¹⁰⁴	28.361 ⁶⁷	62.49 ¹⁰³
20.9	49.988 ¹⁴⁶	86.55 ¹⁶⁴	16.990 ⁸⁹	69.23 ⁷⁵	28.294 ⁸⁷	63.52 ¹⁰²
30.9	49.842 ¹⁶⁶	88.19 ¹³⁸	16.901 ¹⁰²	69.98 ⁴⁶	28.207 ¹⁰⁰	64.54 ⁹⁶
May 10.8	49.676 ¹⁷⁷	89.57 ¹⁰⁷	16.799 ¹¹²	70.44 ¹⁹	28.107 ¹⁰⁸	65.50 ⁸⁶
20.8	49.499 ¹⁸⁰	90.64 ⁷³	16.687 ¹¹⁵	70.63 ⁸	27.999 ¹¹⁰	66.36 ⁷⁴
30.8	49.319 ¹⁷⁶	91.37 ³⁷	16.572 ¹¹⁵	70.55 ³⁵	27.889 ¹⁰⁸	67.10 ⁵⁸
June 9.7	49.143 ¹⁶⁶	91.74 ¹	16.457 ¹¹²	70.20 ⁶⁰	27.781 ¹⁰²	67.68 ⁴²
19.7	48.977 ¹⁵³	91.73 ³⁹	16.345 ¹⁰⁶	69.60 ⁸²	27.679 ⁹⁴	68.10 ²²
29.7	48.824 ¹³¹	91.34 ⁷⁵	16.239 ⁹⁵	68.78 ¹⁰²	27.585 ⁸¹	68.32 ⁴
July 9.7	48.693 ¹⁰⁸	90.59 ¹¹⁰	16.144 ⁸²	67.76 ¹²⁰	27.504 ⁶⁵	68.36 ¹⁵
19.6	48.585 ⁸²	89.49 ¹⁴³	16.062 ⁶⁵	66.56 ¹³²	27.439 ⁴⁸	68.21 ³⁵
29.6	48.503 ⁵¹	88.06 ¹⁷⁴	15.997 ⁴⁵	65.24 ¹⁴¹	27.391 ²⁸	67.86 ⁵⁶
Aug. 8.6	48.452 ¹⁸	86.32 ²⁰²	15.952 ²⁰	63.83 ¹⁴⁴	27.363 ⁴	67.30 ⁷⁷
18.6	48.434 ¹⁸	84.30 ²²⁷	15.932 ⁸	62.39 ¹⁴⁰	27.359 ²¹	66.53 ⁹⁹
28.5	48.452 ⁵⁷	82.03 ²⁴⁸	15.940 ³⁹	60.99 ¹³⁰	27.380 ⁵⁰	65.54 ¹¹⁹
Sept. 7.5	48.509 ⁹⁸	79.55 ²⁶⁶	15.979 ⁷⁵	59.69 ¹¹⁵	27.430 ⁸²	64.35 ¹⁴⁰
17.5	48.607 ¹⁴⁴	76.89 ²⁸⁰	16.054 ¹¹⁴	58.54 ⁹¹	27.512 ¹¹⁸	62.95 ¹⁶¹
27.4	48.751 ¹⁹⁰	74.09 ²⁸⁸	16.168 ¹⁵⁵	57.63 ⁶²	27.630 ¹⁵⁵	61.34 ¹⁸¹
Oct. 7.4	48.941 ²³⁸	71.21 ²⁹²	16.323 ¹⁹⁷	57.01 ²⁷	27.785 ¹⁹³	59.53 ¹⁹⁸
17.4	49.179 ²⁸⁵	68.29 ²⁹⁰	16.520 ²³⁷	56.74 ¹¹	27.978 ²³³	57.55 ²¹³
27.4	49.464 ³³¹	65.39 ²⁸¹	16.757 ²⁷⁵	56.85 ⁵³	28.211 ²⁶⁹	55.42 ²²⁴
Nov. 6.3	49.795 ³⁷⁰	62.58 ²⁶⁵	17.032 ³⁰⁹	57.38 ⁹⁶	28.480 ³⁰³	53.18 ²³⁰
16.3	50.165 ⁴⁰⁴	59.93 ²⁴²	17.341 ³³⁴	58.34 ¹³⁷	28.783 ³³⁰	50.88 ²³⁰
26.3	50.569 ⁴²⁸	57.51 ²¹²	17.675 ³⁵¹	59.71 ¹⁷⁵	29.113 ³⁵⁰	48.58 ²²⁴
Dec. 6.3	50.997 ⁴⁴⁰	55.39 ¹⁷⁴	18.026 ³⁵⁸	61.46 ²⁰⁹	29.463 ³⁶⁰	46.34 ²¹¹
16.2	51.437 ⁴⁴⁰	53.65 ¹³²	18.384 ³⁵³	63.55 ²³⁶	29.823 ³⁶¹	44.23 ¹⁹¹
26.2	51.877 ⁴²⁷	52.33 ⁸⁵	18.737 ³³⁷	65.91 ²⁵⁶	30.184 ³⁴⁸	42.32 ¹⁶⁶
36.2	52.304	51.48	19.074	68.47	30.532	40.66
Mean Place	47.454	83.67	15.662	55.60	26.444	67.34
Sec δ , Tan δ	1.411	+0.996	1.082	-0.413	1.070	+0.382
a, a'	+3.4	-19.5	+2.9	-19.5	+3.2	-19.6
b, b'	-0.06	-0.2	+0.03	-0.2	-0.02	-0.2
Authority and Catalogue No.	B.J.	680	B.J.	682	B.J.	683

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name	θ Leonis			δ Crateris			γ Leonis		
Mag. Spect.	3.41		Ao	3.82		Ko	5.18		Ko
Mean Solar Date	R.A.		Dec.	R.A.		Dec.	R.A.		Dec.
	^h II	^m IO	^s +15 48	^h II	^m I5	^s -14 24	^h II	^m 24	^s +3 13
Jan. 1.2	37.562	327	22.49 164	53.347	319	10.48 246	23.428	322	72.10 205
11.2	37.889	299	20.85 135	53.666	289	12.94 246	23.750	296	70.05 189
21.1	38.188	263	19.50 104	53.955	253	15.40 240	24.046	261	68.16 166
31.1	38.451	220	18.46 70	54.208	212	17.80 227	24.307	222	66.50 142
Feb. 10.1	38.671	173	17.76 38	54.420	166	20.07 209	24.529	179	65.08 114
20.1	38.844	125	17.38 7	54.586	121	22.16 188	24.708	133	63.94 86
Mar. 2.0	38.969	78	17.31 20	54.707	76	24.04 164	24.841	89	63.08 59
12.0	39.047	35	17.51 43	54.783	35	25.68 139	24.930	49	62.49 34
21.9	39.082	4	17.94 60	54.818	1	27.07 115	24.979	11	62.15 11
31.9	39.078	37	18.54 74	54.817	31	28.22 89	24.990	20	62.04 8
Apr. 10.9	39.041	62	19.28 81	54.786	57	29.11 64	24.970	46	62.12 24
20.9	38.979	82	20.09 84	54.729	76	29.75 41	24.924	65	62.36 36
30.9	38.897	95	20.93 83	54.653	89	30.16 18	24.859	80	62.72 46
May 10.8	38.802	102	21.76 77	54.564	98	30.34 3	24.779	88	63.18 52
20.8	38.700	104	22.53 70	54.466	103	30.31 23	24.691	94	63.70 56
30.8	38.596	103	23.23 60	54.363	103	30.08 43	24.597	94	64.26 59
June 9.8	38.493	97	23.83 47	54.260	100	29.65 59	24.503	92	64.85 58
19.7	38.396	89	24.30 34	54.160	96	29.06 75	24.411	87	65.43 56
29.7	38.307	77	24.64 20	54.064	86	28.31 88	24.324	78	65.99 53
July 9.7	38.230	62	24.84 4	53.978	74	27.43 98	24.246	67	66.52 47
19.6	38.168	46	24.88 13	53.904	59	26.45 105	24.179	54	66.99 40
29.6	38.122	27	24.75 31	53.845	42	25.40 108	24.125	38	67.39 30
Aug. 8.6	38.095	4	24.44 49	53.803	19	24.32 106	24.087	17	67.69 18
18.6	38.091	21	23.95 69	53.784	6	23.26 100	24.070	7	67.87 2
28.5	38.112	49	23.26 89	53.790	36	22.26 87	24.077	33	67.89 16
Sept. 7.5	38.161	80	22.37 111	53.826	68	21.39 70	24.110	64	67.73 36
17.5	38.241	115	21.26 132	53.894	105	20.69 47	24.174	97	67.37 59
27.5	38.356	151	19.94 153	53.999	144	20.22 19	24.271	135	66.78 83
Oct. 7.4	38.507	190	18.41 174	54.143	184	20.03 13	24.406	173	65.95 110
17.4	38.697	227	16.67 191	54.327	224	20.16 47	24.579	211	64.85 135
27.4	38.924	264	14.76 207	54.551	261	20.63 85	24.790	249	63.50 160
Nov. 6.3	39.188	296	12.69 217	54.812	294	21.48 121	25.039	283	61.90 183
16.3	39.484	324	10.52 223	55.106	321	22.69 155	25.322	310	60.07 200
26.3	39.808	343	08.29 222	55.427	339	24.24 186	25.632	331	58.07 214
Dec. 6.3	40.151	352	06.07 215	55.766	348	26.10 212	25.963	342	55.93 220
16.2	40.503	352	03.92 200	56.114	346	28.22 231	26.305	343	53.73 220
26.2	40.855	340	01.92 180	56.460	332	30.53 243	26.648	333	51.53 214
36.2	41.195		00.12	56.792		32.96	26.981		49.39
Mean Place	37.226	25.24		53.314	17.50		23.300	71.28	
Sec δ , Tan δ	1.039	+0.283		1.032	-0.257		1.002	+0.057	
a, a'	+3.2	-19.6		+3.0	-19.7		+3.1	-19.8	
b, b'	-0.02	-0.2		+0.02	-0.2		0.00	-0.2	
Authority and Catalogue No.	B.J.	684		B.J.	690		N.A.	697	

§ Transit, Mar. 11.

† First transit, Mar. 12.

APPARENT PLACES OF STARS, 1931.

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AT UPPER TRANSIT AT GREENWICH.

Name Mag. Spect.	λ Draconis		ξ Hydræ		λ Centauri	
	4.06	Ma	3.72	G5	3.34	B9
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h II 27	^m +69 42	^h II 29	^m -31 28	^h II 32	^m -62 37
Jan. 1.2	21.98	28.15	36.010	19.91	34.86	56.40
11.2	22.73	28.21	36.358	22.56	35.39	58.96
21.1	23.43	28.88	36.676	25.37	35.88	61.94
31.1	24.04	30.13	36.955	28.28	36.30	65.25
Feb. 10.1	24.56	31.90	37.190	31.21	36.65	68.80
20.1	24.98	34.10	37.377	34.08	36.92	72.50
Mar. 2.0	25.27	36.64	37.515	36.84	37.10	76.27
12.0	25.43	39.39	37.605	39.42	37.21	80.00
21.9	25.47	42.24	37.651	41.78	37.24	83.61
31.9	25.39	45.06	37.656	43.90	37.20	87.04
Apr. 10.9	25.21	47.75	37.626	45.75	37.09	90.23
20.9	24.93	50.20	37.567	47.30	36.92	93.11
30.9	24.58	52.31	37.484	48.54	36.71	95.63
May 10.8	24.17	54.02	37.382	49.46	36.45	97.74
20.8	23.72	55.26	37.266	50.05	36.16	99.41
30.8	23.24	56.01	37.141	50.32	35.84	100.61
June 9.8	22.76	56.23	37.011	50.26	35.50	101.31
19.7	22.29	55.93	36.880	49.89	35.16	101.50
29.7	21.85	55.12	36.752	49.22	34.83	101.18
July 9.7	21.44	53.80	36.630	48.26	34.49	100.37
19.7	21.07	52.02	36.519	47.04	34.17	99.10
29.6	20.76	49.80	36.422	45.62	33.89	97.41
Aug. 8.6	20.51	47.20	36.345	44.03	33.65	95.34
18.6	20.33	44.26	36.292	42.34	33.46	92.96
28.5	20.23	41.05	36.269	40.60	33.33	90.37
Sept. 7.5	20.21	37.63	36.280	38.90	33.27	87.65
17.5	20.28	34.05	36.329	37.30	33.29	84.90
27.5	20.44	30.39	36.422	35.90	33.40	82.23
Oct. 7.4	20.70	26.72	36.561	34.75	33.59	79.76
17.4	21.05	23.12	36.747	33.94	33.87	77.60
27.4	21.49	19.66	36.979	33.53	34.24	75.84
Nov. 6.4	22.01	16.43	37.255	33.54	34.68	74.57
16.3	22.62	13.51	37.570	34.03	35.18	73.85
26.3	23.30	10.98	37.915	34.99	35.73	73.74
Dec. 6.3	24.03	08.92	38.283	36.40	36.32	74.25
16.2	24.80	07.39	38.660	38.23	36.92	75.38
26.2	25.58	06.45	39.037	40.43	37.51	77.10
36.2	26.34	06.12	39.401	42.93	38.08	79.36
Mean Place	19.758	43.72	36.189	32.08	35.374	76.24
Sec δ, Tan δ	2.884	+2.705	1.173	-0.612	2.176	-1.932
a, a'	+3.6	-19.8	+3.0	-19.9	+2.8	-19.9
b, b'	-0.18	-0.1	+0.04	-0.1	+0.13	-0.1
Authority and Catalogue No.	B.J.	701	B.J.	702	B.J.	704

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name	♋ Leonis		♍ Virginis		♊ Leonis (<i>Denebola</i>)	
	4.47	Ko	4.20	Ma	2.23	A2
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h II ^m 33	[°] —0 ['] 26	^h II ^m 42	[°] +6 ['] 54	^h II ^m 45	[°] +14 ['] 57
Jan. 1.2	24.933 ^s 324	31.66 216	18.800 ^s 330	56.94 ^s 200	32.579 ^s 338	24.24 182
11.2	25.257 299	33.82 202	19.130 307	54.94 180	32.917 316	22.42 154
21.2	25.556 267	35.84 184	19.437 276	53.14 156	33.233 285	20.88 122
31.1	25.823 228	37.68 161	19.713 239	51.58 126	33.518 246	19.66 87
Feb. 10.1	26.051 185	39.29 136	19.952 196	50.32 98	33.764 204	18.79 53
20.1	26.236 141	40.65 109	20.148 152	49.34 66	33.968 158	18.26 20
Mar. 2.0	26.377 97	41.74 82	20.300 108	48.68 39	34.126 113	18.06 11
12.0	26.474 57	42.56 56	20.408 67	48.29 12	34.239 70	18.17 37
21.9	26.531 20	43.12 33	20.475 29	48.17 29	34.309 30	18.54 59
31.9	26.551 12	43.45 11	20.504 4	48.27 10	34.339 5	19.13 74
Apr. 10.9	26.539 37	43.56 5	20.500 32	48.56 44	34.334 33	19.87 85
20.9	26.502 59	43.51 21	20.468 53	49.00 55	34.301 56	20.72 91
30.9	26.443 73	43.30 33	20.415 69	49.55 61	34.245 74	21.63 91
May 10.9	26.370 84	42.97 43	20.346 82	50.16 64	34.171 87	22.54 88
20.8	26.286 90	42.54 49	20.264 89	50.80 66	34.084 95	23.42 81
30.8	26.196 92	42.05 55	20.175 93	51.46 63	33.989 99	24.23 71
June 9.8	26.104 92	41.50 59	20.082 92	52.09 59	33.890 99	24.94 59
19.7	26.012 88	40.91 60	19.990 91	52.68 53	33.791 97	25.53 46
29.7	25.924 82	40.31 59	19.899 84	53.21 46	33.694 90	25.99 30
July 9.7	25.842 72	39.72 57	19.815 77	53.67 36	33.604 82	26.29 14
19.7	25.770 60	39.15 53	19.738 64	54.03 26	33.522 70	26.43 3
29.6	25.710 45	38.62 45	19.674 51	54.29 12	33.452 55	26.40 23
Aug. 8.6	25.665 26	38.17 35	19.623 32	54.41 3	33.397 37	26.17 42
18.6	25.639 3	37.82 22	19.591 10	54.38 19	33.360 15	25.75 63
28.6	25.636 24	37.60 6	19.581 17	54.19 39	33.345 12	25.12 85
Sept. 7.5	25.660 54	37.54 14	19.598 46	53.80 59	33.357 42	24.27 107
17.5	25.714 88	37.68 37	19.644 79	53.21 82	33.399 76	23.20 130
27.5	25.802 125	38.05 61	19.723 117	52.39 107	33.475 113	21.90 153
Oct. 7.4	25.927 165	38.66 89	19.840 157	51.32 130	33.588 154	20.37 175
17.4	26.092 204	39.55 116	19.997 196	50.02 155	33.742 195	18.62 194
27.4	26.296 242	40.71 144	20.193 236	48.47 178	33.937 235	16.68 212
Nov. 6.4	26.538 277	42.15 170	20.429 271	46.69 196	34.172 272	14.56 225
16.3	26.815 307	43.85 191	20.700 303	44.73 212	34.444 304	12.31 232
26.3	27.122 328	45.76 208	21.003 326	42.61 221	34.748 329	09.99 234
Dec. 6.3	27.450 341	47.84 219	21.329 341	40.40 225	35.077 346	07.65 229
16.3	27.791 343	50.03 224	21.670 345	38.15 221	35.423 351	05.36 217
26.2	28.134 335	52.27 221	22.015 339	35.94 211	35.774 347	03.19 197
36.2	28.469	54.48	22.354	33.83	36.121	01.22
Mean Place	24.889	33.42	18.737	58.02	32.449	28.14
Sec δ, Tan δ	1.000	—0.008	1.007	+0.121	1.035	+0.267
a, a'	+3.1	—19.9	+3.1	—20.0	+3.1	—20.0
b, b'	0.00	—0.1	—0.01	—0.1	—0.02	—0.1
Authority and Catalogue No.	B.J.	706	N.A.	712	B.J.	717

APPARENT PLACES OF STARS, 1931.

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AT UPPER TRANSIT AT GREENWICH.

Name	β Virginis		B Centauri		γ Ursæ Majoris	
	3.80	F8	4.71	Ko	2.54	Ao
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h II ^m 47	[°] +2 ['] 08	^h II ^m 47	[°] -44 ['] 47	^h II ^m 50	[°] +54 ['] 04
Jan. 1.2	05.999 331	73.69 212	40.820 404	06.48 253	13.434 493	28.14 72
11.2	06.330 309	71.57 197	41.224 372	09.01 283	13.927 466	27.42 14
21.2	06.639 278	69.60 176	41.596 330	11.84 306	14.393 424	27.28 43
31.1	06.917 241	67.84 151	41.926 282	14.90 321	14.817 369	27.71 96
Feb. 10.1	07.158 200	66.33 124	42.208 229	18.11 327	15.186 303	28.67 145
20.1	07.358 156	65.09 96	42.437 175	21.38 324	15.489 232	30.12 184
Mar. 2.0	07.514 113	64.13 68	42.612 120	24.62 316	15.721 159	31.96 216
12.0	07.627 72	63.45 42	42.732 68	27.78 301	15.880 86	34.12 237
21.9	07.699 35	63.03 18	42.800 21	30.79 280	15.966† 17	36.49 247
31.9	07.734 3	62.85 2	42.821 22	33.59 255	15.983 47	38.96 246
Apr. 10.9	07.737 24	62.87 19	42.799 60	36.14 226	15.936 102	41.42 235
20.9	07.713 47	63.06 33	42.739 93	38.40 193	15.834 147	43.77 215
30.9	07.666 63	63.39 43	42.646 119	40.33 157	15.687 183	45.92 187
May 10.9	07.603 76	63.82 51	42.527 141	41.90 120	15.504 210	47.79 153
20.8	07.527 84	64.33 55	42.386 158	43.10 81	15.294 227	49.32 114
30.8	07.443 89	64.88 58	42.228 170	43.91 40	15.067 236	50.46 71
June 9.8	07.354 90	65.46 58	42.058 177	44.31 1	14.831 236	51.17 27
19.7	07.264 88	66.04 58	41.881 179	44.30 1	14.595 231	51.44 17
29.7	07.176 84	66.62 54	41.702 176	43.89 79	14.364 217	51.27 63
July 9.7	07.092 76	67.16 48	41.526 167	43.10 116	14.147 197	50.64 108
19.7	07.016 66	67.64 42	41.359 152	41.94 148	13.950 173	49.56 149
29.6	06.950 52	68.06 32	41.207 131	40.46 175	13.777 144	48.07 188
Aug. 8.6	06.898 35	68.38 20	41.076 103	38.71 197	13.633 109	46.19 223
18.6	06.863 13	68.58 6	40.973 68	36.74 212	13.524 69	43.96 255
28.6	06.850 12	68.64 11	40.905 26	34.62 218	13.455 25	41.41 283
Sept. 7.5	06.862 42	68.53 30	40.879 21	32.44 216	13.430 25	38.58 306
17.5	06.904 76	68.23 54	40.900 74	30.28 204	13.455 78	35.52 323
27.5	06.980 113	67.69 79	40.974 130	28.24 183	13.533 135	32.29 335
Oct. 7.4	07.093 152	66.90 104	41.104 189	26.41 153	13.668 195	28.94 341
17.4	07.245 193	65.86 131	41.293 246	24.88 115	13.863 255	25.53 339
27.4	07.438 233	64.55 156	41.539 300	23.73 69	14.118 316	22.14 329
Nov. 6.4	07.671 270	62.99 179	41.839 348	23.04 20	14.434 371	18.85 311
16.3	07.941 301	61.20 199	42.187 386	22.84 33	14.805 420	15.74 285
26.3	08.242 325	59.21 214	42.573 415	23.17 87	15.225 461	12.89 252
Dec. 6.3	08.567 341	57.07 222	42.988 431	24.04 139	15.686 489	10.37 209
16.3	08.908 346	54.85 224	43.419 432	25.43 187	16.175 503	08.28 161
26.2	09.254 340	52.61 219	43.851 420	27.30 231	16.678 501	06.67 107
36.2	09.594	50.42	44.271	29.61	17.179	05.60
Mean Place	06.010	73.30	41.267	22.06	12.557	42.74
Sec δ , Tan δ	1.001	+0.038	1.409	-0.993	1.705	+1.380
a, a'	+3.1	-20.0	+3.0	-20.0	+3.2	-20.0
b, b'	0.00	-0.1	+0.07	-0.1	-0.09	0.0
Authority and Catalogue No.	B.J.	718	A.N.	719	B.J.	722

† Second transit, Mar. 21.

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name Mag. Spect.	π Virginis		σ Virginis		δ Centauri	
	4.57	A3	4.24	G5	2.88	B3p
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 11 ^m 57	^h +0 ^m 59	^h 12 ^m 01	^h +0 ^m 06	^h 12 ^m 04	^h -50 ^m 20
Jan. 1.2	20.175	55.22	41.610	56.10	45.741	00.63
11.2	20.510	53.19	41.947	54.10	46.188	02.97
21.2	20.824	51.35	42.265	52.32	46.605	05.67
31.1	21.109	49.77	42.554	50.81	46.980	08.66
Feb. 10.1	21.359	48.48	42.808	49.60	47.305	11.86
20.1	21.568	47.49	43.022	48.72	47.575	15.18
Mar. 2.1	21.735	46.80	43.192	48.16	47.787	18.54
12.0	21.858	46.42	43.320	47.90	47.941	21.87
22.0	21.940†	46.30	43.406	47.91	48.039	25.09
31.9	21.984	46.42	43.454	48.16	48.084	28.14
Apr. 10.9	21.995	46.73	43.468	48.60	48.080	30.98
20.9	21.977	47.19	43.452	49.18	48.033	33.55
30.9	21.936	47.77	43.413	49.87	47.947	35.81
May 10.9	21.876	48.42	43.355	50.61	47.827	37.73
20.8	21.802	49.10	43.282	51.37	47.679	39.27
30.8	21.719	49.78	43.199	52.12	47.508	40.40
June 9.8	21.630	50.45	43.110	52.82	47.319	41.12
19.8	21.538	51.07	43.017	53.46	47.117	41.40
29.7	21.446	51.63	42.922	54.03	46.907	41.24
July 9.7	21.357	52.10	42.832	54.48	46.697	40.67
19.7	21.275	52.48	42.747	54.81	46.492	39.69
29.7	21.202	52.74	42.670	55.00	46.300	38.33
Aug. 8.6	21.141	52.87	42.606	55.05	46.128	36.64
18.6	21.097	52.85	42.558	54.93	45.985	34.68
28.6	21.073	52.65	42.530	54.62	45.879	32.52
Sept. 7.5	21.075	52.26	42.527	54.12	45.818	30.23
17.5	21.106	51.67	42.553	53.40	45.809	27.90
27.5	21.170	50.84	42.612	52.44	45.859	25.64
Oct. 7.5	21.272	49.77	42.708	51.25	45.972	23.54
17.4	21.413	48.46	42.845	49.82	46.151	21.69
27.4	21.596	46.91	43.023	48.16	46.396	20.19
Nov. 6.4	21.819	45.12	43.243	46.28	46.703	19.12
16.4	22.080	43.15	43.501	44.23	47.066	18.55
26.3	22.375	41.02	43.793	42.03	47.475	18.51
Dec. 6.3	22.696	38.79	44.112	39.75	47.919	19.02
16.3	23.034	36.53	44.450	37.46	48.384	20.08
26.2	23.379	34.29	44.796	35.22	48.856	21.67
36.2	23.721	32.15	45.140	33.10	49.318	23.74
Mean Place	20.198	56.88	41.637	58.65	46.422	17.23
Sec δ , Tan δ	1.008	+0.123	1.013	+0.160	1.567	-1.206
a, a'	+3.1	-20.0	+3.1	-20.0	+3.1	-20.0
b, b'	-0.01	0.0	-0.01	0.0	+0.08	0.0
Authority and Catalogue No.	N.A.	726	B.J.	730	B.J.	733

† First transit, Mar. 22.

AT UPPER TRANSIT AT GREENWICH.

Name Mag. Spect.	ε Corvi		δ Crucis		δ Ursæ Majoris	
	3·21	Ko	3·08	B3	3·44	A2
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 12 ^m 06	[°] —22 ['] 14	^h 12 ^m 11	[°] —58 ['] 21	^h 12 ^m 12	[°] +57 ['] 24
Jan. 1·2	33·967 ^s	01·22	27·235 ^s	35·88	01·876 ^s	40·85
11·2	34·316 ^s 349	03·61 ^s 239	27·758 ^s 523	38·04 ^s 216	02·407 ^s 531	39·97 ^s 88
21·2	34·644 ^s 328	06·10 ^s 249	28·246 ^s 488	40·64 ^s 260	02·916 ^s 509	39·69 ^s 28
31·1	34·941 ^s 297	08·63 ^s 253	28·687 ^s 441	43·59 ^s 295	03·387 ^s 471	40·01 ^s 32
Feb. 10·1	35·202 ^s 261	11·13 ^s 250	29·072 ^s 385	46·82 ^s 323	03·804 ^s 477	40·90 ^s 89
	220	240	321	342	354	141
20·1	35·422 ^s 176	13·53 ^s 226	29·393 ^s 254	50·24 ^s 353	04·158 ^s 281	42·31 ^s 186
Mar. 2·1	35·598 ^s 133	15·79 ^s 208	29·647 ^s 186	53·77 ^s 354	04·439 ^s 202	44·17 ^s 221
12·0	35·731 ^s 91	17·87 ^s 188	29·833 ^s 119	57·31 ^s 349	04·641 ^s 125	46·38 ^s 246
22·0	35·822 ^s 53	19·75 ^s 164	29·952 ^s 55	60·80 ^s 336	04·766 ^s 49	48·84 ^s 260
31·9	35·875 ^s 19	21·39 ^s 140	30·007 ^s 4	64·16 ^s 317	04·815 ^s 22	51·44 ^s 263
Apr. 10·9	35·894 ^s 11	22·79 ^s 116	30·003 ^s 59	67·33 ^s 293	04·793 ^s 86	54·07 ^s 254
20·9	35·883 ^s 36	23·95 ^s 91	29·944 ^s 109	70·26 ^s 262	04·707 ^s 140	56·61 ^s 236
30·9	35·847 ^s 58	24·86 ^s 66	29·835 ^s 152	72·88 ^s 228	04·567 ^s 186	58·97 ^s 210
May 10·9	35·789 ^s 74	25·52 ^s 42	29·683 ^s 190	75·16 ^s 188	04·381 ^s 221	61·07 ^s 175
20·8	35·715 ^s 88	25·94 ^s 18	29·493 ^s 222	77·04 ^s 147	04·160 ^s 246	62·82 ^s 136
30·8	35·627 ^s 97	26·12 ^s 6	29·271 ^s 248	78·51 ^s 102	03·914 ^s 263	64·18 ^s 93
June 9·8	35·530 ^s 104	26·06 ^s 29	29·023 ^s 267	79·53 ^s 55	03·651 ^s 270	65·11 ^s 47
19·8	35·426 ^s 108	25·77 ^s 51	28·756 ^s 278	80·08 ^s 7	03·381 ^s 270	65·58 ^s 2
29·7	35·318 ^s 108	25·26 ^s 70	28·478 ^s 281	80·15 ^s 40	03·111 ^s 261	65·56 ^s 49
July 9·7	35·210 ^s 104	24·56 ^s 88	28·197 ^s 276	79·75 ^s 85	02·850 ^s 246	65·07 ^s 96
19·7	35·106 ^s 96	23·68 ^s 102	27·921 ^s 262	78·90 ^s 129	02·604 ^s 224	64·11 ^s 141
29·7	35·010 ^s 85	22·66 ^s 113	27·659 ^s 237	77·61 ^s 168	02·380 ^s 196	62·70 ^s 183
Aug. 8·6	34·925 ^s 67	21·53 ^s 120	27·422 ^s 202	75·93 ^s 201	02·184 ^s 161	60·87 ^s 222
18·6	34·858 ^s 46	20·33 ^s 122	27·220 ^s 157	73·92 ^s 228	02·023 ^s 122	58·65 ^s 257
28·6	34·812 ^s 18	19·11 ^s 117	27·063 ^s 102	71·64 ^s 246	01·901 ^s 75	56·08 ^s 288
Sept. 7·5	34·794 ^s 16	17·94 ^s 108	26·961 ^s 37	69·18 ^s 255	01·826 ^s 24	53·20 ^s 314
17·5	34·810 ^s 53	16·86 ^s 91	26·924 ^s 35	66·63 ^s 253	01·802 ^s 34	50·06 ^s 334
27·5	34·863 ^s 96	15·95 ^s 69	26·959 ^s 112	64·10 ^s 242	01·836 ^s 96	46·72 ^s 349
Oct. 7·5	34·959 ^s 141	15·26 ^s 41	27·071 ^s 193	61·68 ^s 220	01·932 ^s 162	43·23 ^s 356
17·4	35·100 ^s 186	14·85 ^s 8	27·264 ^s 272	59·48 ^s 187	02·094 ^s 229	39·67 ^s 356
27·4	35·286 ^s 232	14·77 ^s 29	27·536 ^s 347	57·61 ^s 144	02·323 ^s 295	36·11 ^s 348
Nov. 6·4	35·518 ^s 274	15·06 ^s 68	27·883 ^s 416	56·17 ^s 96	02·618 ^s 361	32·63 ^s 331
16·4	35·792 ^s 309	15·74 ^s 106	28·299 ^s 471	55·21 ^s 42	02·979 ^s 419	29·32 ^s 306
26·3	36·101 ^s 337	16·80 ^s 144	28·770 ^s 514	54·79 ^s 17	03·398 ^s 468	26·26 ^s 272
Dec. 6·3	36·438 ^s 355	18·24 ^s 177	29·284 ^s 540	54·96 ^s 75	03·866 ^s 505	23·54 ^s 230
16·3	36·793 ^s 362	20·01 ^s 206	29·824 ^s 548	55·71 ^s 133	04·371 ^s 527	21·24 ^s 180
26·2	37·155 ^s 358	22·07 ^s 228	30·372 ^s 540	57·04 ^s 186	04·898 ^s 534	19·44 ^s 126
36·2	37·513 ^s	24·35 ^s	30·912 ^s	58·90 ^s	05·432 ^s	18·18 ^s
Mean Place	34·319	09·44	28·163	54·10	01·076	57·06
Sec δ, Tan δ	1·080	—0·409	1·907	—1·623	1·857	+1·565
a, a'	+3·1	—20·0	+3·2	—20·0	+3·0	—20·0
b, b'	+0·03	0·0	+0·11	+0·1	—0·10	+0·1
Authority and Catalogue No.	B.J.	735	A.N.	738	B.J.	739

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name	γ Corvi		β Chamæleontis		η Virginis	
	2.78	B8	4.38	B5	4.00	A0
Mag. Spect.						
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 12	^m 12	^h 12	^m 14	^h 12	^m 16
		[°] —17		[°] —78		[°] —0
		['] 09		['] 55		['] 17
Jan. 1.2	14.897	25.61	13.24	23.98	22.239	00.14
11.2	15.240 343	27.94 233	14.47 123	25.75 177	22.576 337	02.32 218
21.2	15.564 324	30.33 239	15.61 114	28.06 231	22.895 319	04.37 205
31.1	15.860 296	32.71 238	16.64 103	30.85 279	23.188 293	06.24 187
Feb. 10.1	16.121 261	35.01 230	17.53 89	34.04 319	23.449 261	07.89 165
20.1	16.343 222	37.18 217	18.27 74	37.54 350	23.671 222	09.28 139
Mar. 2.1	16.523 180	39.19 201	18.84 57	41.27 373	23.853 182	10.39 111
12.0	16.660 137	40.99 180	19.24 40	45.13 386	23.993 140	11.23 84
22.0	16.758 98	42.57 158	19.46 22	49.03 390	24.094 101	11.80 57
31.9	16.818 60	43.92 135	19.51 5	52.89 386	24.157 63	12.12 32
Apr. 10.9	16.844 26	45.04 112	19.40 11	56.63 374	24.188 31	12.23 11
20.9	16.841 3	45.92 88	19.13 27	60.18 355	24.189 1	12.14 9
30.9	16.813 28	46.57 65	18.71 42	63.46 328	24.166 23	11.90 24
May 10.9	16.763 50	47.01 44	18.16 55	66.41 295	24.122 44	11.54 36
20.8	16.697 66	47.23 22	17.48 68	68.97 256	24.062 60	11.09 45
30.8	16.618 79	47.25 2	16.71 77	71.09 212	23.990 72	10.57 52
June 9.8	16.529 89	47.08 17	15.85 86	72.71 162	23.909 81	10.51 56
19.8	16.432 97	46.73 35	14.93 92	73.82 111	23.822 87	09.43 58
29.7	16.332 100	46.21 52	13.98 95	74.40 58	23.731 91	08.83 60
July 9.7	16.231 101	45.55 66	13.01 97	74.41 1	23.640 91	08.26 57
19.7	16.132 99	44.76 79	12.06 95	73.86 55	23.552 88	07.73 53
29.7	16.040 92	43.85 91	11.15 91	72.79 107	23.470 82	07.25 48
Aug. 8.6	15.958 82	42.88 97	10.32 83	71.21 158	23.397 73	06.85 40
18.6	15.892 66	41.90 98	09.60 72	69.19 202	23.338 59	06.55 30
28.6	15.847 45	40.93 97	09.02 58	66.79 240	23.297 41	06.37 18
Sept. 7.5	15.828 19	40.01 92	08.60 42	64.10 269	23.280 17	06.35 2
17.5	15.840 12	39.22 79	08.36 24	61.21 289	23.292 12	06.52 17
27.5	15.888 48	38.60 62	08.33 3	58.23 298	23.337 45	06.91 39
Oct. 7.5	15.977 89	38.20 40	08.51 18	55.29 294	23.419 82	07.53 62
17.4	16.109 132	38.08 12	08.90 39	52.49 280	23.542 123	08.41 88
27.4	16.286 177	38.28 20	09.50 60	49.97 252	23.707 165	09.56 115
Nov. 6.4	16.507 221	38.82 54	10.30 80	47.83 214	23.915 208	10.98 142
16.4	16.770 263	39.71 89	11.27 97	46.16 167	24.163 248	12.64 166
26.3	17.068 298	40.95 124	12.38 111	45.04 112	24.447 284	14.53 189
Dec. 6.3	17.394 326	42.51 156	13.59 121	44.53 51	24.759 312	16.59 206
16.3	17.740 346	44.37 186	14.86 127	44.66 13	25.092 333	18.77 218
26.2	18.094 354	46.46 209	16.15 129	45.43 77	25.434 342	21.00 223
36.2	18.446 352	48.72 226	17.42 127	46.83 140	25.777 343	23.22 222
Mean Place	15.238	31.92	15.681	45.24	22.444	00.34
Sec δ , Tan δ	1.047	—0.309	5.208	—5.111	1.000	—0.005
a, a'	+3.1	—20.0	+3.5	—20.0	+3.1	—20.0
b, b'	+0.02	+0.1	+0.34	+0.1	0.00	+0.1
Authority and Catalogue No.	A.N.	740	B.J.	742	B.J.	744

APPARENT PLACES OF STARS, 1931.

435

AT UPPER TRANSIT AT GREENWICH.

Name	α^1 Crucis			δ Corvi			γ Crucis		
Mag. Spect.	1.58		Br	3.11		Ao	1.61		Mb
Mean Solar Date	R.A.		Dec.	R.A.		Dec.	R.A.		Dec.
	^h 12	^m 22	[°] —62 ['] 42	^h 12	^m 26	[°] —16 ['] 07	^h 12	^m 27	[°] —56 ['] 43
Jan. 1.2	43.52		41.82	16.989		47.59	18.497		19.44
11.2	44.11	59	43.79	17.336	347	49.87	19.013	516	21.44
21.2	44.66	55	46.23	17.665	329	52.20	19.501	488	23.89
31.2	45.17	51	49.07	17.969	304	54.52	19.948	447	26.69
Feb. 10.1	45.62	45	52.23	18.240	271	56.76	20.345	397	29.78
		37			234			338	
20.1	45.99	31	55.62	18.474	193	58.87	20.683	277	33.07
Mar. 2.1	46.30	23	59.16	18.667	152	60.81	20.960	212	36.48
12.0	46.53	15	62.76	18.819	112	62.54	21.172	149	39.93
22.0	46.68	8	66.35	18.931	75	64.06	21.321	89	43.34
31.9	46.76	1	69.86	19.006	41	65.34	21.410	31	46.65
Apr. 10.9	46.77	5	73.20	19.047	11	66.40	21.441	22	49.79
20.9	46.72	11	76.32	19.058	15	67.24	21.419	72	52.71
30.9	46.61	16	79.17	19.043	37	67.86	21.347	115	55.36
May 10.9	46.45	22	81.68	19.006	55	68.27	21.232	155	57.67
20.9	46.23	25	83.82	18.951	71	68.48	21.077	188	59.63
30.8	45.98	28	85.54	18.880	82	68.50	20.889	216	61.19
June 9.8	45.70	31	86.80	18.798	92	68.35	20.673	239	62.33
19.8	45.39	33	87.59	18.706	98	68.03	20.434	254	63.01
29.7	45.06	34	87.89	18.608	101	67.56	20.180	262	63.24
July 9.7	44.72	34	87.69	18.507	101	66.95	19.918	262	63.00
19.7	44.38	32	87.01	18.406	97	66.23	19.656	253	62.31
29.7	44.06	30	85.87	18.309	88	65.42	19.403	234	61.20
Aug. 8.6	43.76	25	84.30	18.221	75	64.54	19.169	205	59.69
18.6	43.51	21	82.35	18.146	56	63.64	18.964	166	57.84
28.6	43.30	15	80.10	18.090	31	62.75	18.798	116	55.72
Sept. 7.6	43.15	7	77.62	18.059	2	61.92	18.682	57	53.39
17.5	43.08	—	75.00	18.057	34	61.21	18.625	10	50.95
27.5	43.08	10	72.35	18.091	74	60.66	18.635	85	48.49
Oct. 7.5	43.18	19	69.77	18.165	117	60.32	18.720	162	46.12
17.4	43.37	28	67.38	18.282	163	60.24	18.882	239	43.94
27.4	43.65	37	65.28	18.445	208	60.46	19.121	315	42.06
Nov. 6.4	44.02	45	63.57	18.653	252	61.01	19.436	384	40.57
16.4	44.47	51	62.34	18.905	289	61.90	19.820	442	39.53
26.3	44.98	57	61.64	19.194	319	63.13	20.262	488	39.02
Dec. 6.3	45.55	60	61.53	19.513	341	64.07	20.750	518	39.07
16.3	46.15	61	62.01	19.854	352	66.49	21.268	533	39.68
26.3	46.76	61	63.09	20.206	353	68.54	21.801	529	40.85
36.2	47.37		64.73	20.559		70.75	22.330		42.56
Mean Place	44.729	60.57		17.407	53.06		19.563	36.83	
Sec δ , Tan δ	2.182	—1.939		1.041	—0.289		1.823	—1.524	
a, a'	+3.3	—19.9		+3.1	—19.9		+3.3	—19.9	
b, b'	+0.13	+0.1		+0.02	+0.1		+0.10	+0.1	
Authority and Catalogue No.	A.E.	748		B.J.	755		A.N.	757	

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name	κ Draconis		β Corvi		α Muscæ	
	3.88	B5p	2.84	G5	2.94	B3
Mag. Spect.						
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 12 ^m 30	[°] +70 ['] 09	^h 12 ^m 30	[°] -23 ['] 00	^h 12 ^m 33	[°] -68 ['] 45
Jan. 1.2	34.17	47.33	44.960	47.42	01.21	00.47
11.2	34.94	46.55	45.317	49.68	01.94	02.19
21.2	35.69	46.42	45.658	52.07	02.63	04.43
31.2	36.40	46.93	45.973	54.52	03.26	07.11
Feb. 10.1	37.04	48.06	46.255	56.96	03.82	10.17
20.1	37.59	49.74	46.498	59.33	04.30	13.52
Mar. 2.1	38.03	51.89	46.700	61.58	04.70	17.07
12.1	38.36	54.42	46.860	63.66	05.00	20.74
22.0	38.57	57.20	46.980	65.56	05.21	24.44
31.9	38.66†	60.12	47.061†	67.25	05.32†	28.10
Apr. 10.9	38.63	63.05	47.108	68.71	05.35	31.63
20.9	38.49	65.89	47.123	69.94	05.30	34.98
30.9	38.25	68.52	47.110	70.94	05.17	38.09
May 10.9	37.93	70.84	47.074	71.70	04.97	40.88
20.9	37.54	72.79	47.018	72.23	04.70	43.30
30.8	37.10	74.29	46.945	72.52	04.37	45.31
June 9.8	36.62	75.30	46.858	72.58	04.00	46.87
19.8	36.13	75.79	46.760	72.43	03.59	47.94
29.8	35.62	75.75	46.653	72.05	03.14	48.51
July 9.7	35.12	75.18	46.543	71.48	02.68	48.55
19.7	34.64	74.09	46.433	70.73	02.23	48.08
29.7	34.19	72.50	46.325	69.82	01.79	47.11
Aug. 8.6	33.78	70.44	46.226	68.79	01.38	45.67
18.6	33.43	67.96	46.141	67.67	01.01	43.81
28.6	33.14	65.10	46.075	66.51	00.70	41.59
Sept. 7.6	32.92	61.91	46.035	65.37	00.48	39.08
17.5	32.78	58.46	46.026	64.29	00.34	36.39
27.5	32.74	54.80	46.054	63.35	00.31	33.61
Oct. 7.5	32.79	51.01	46.125	62.61	00.39	30.85
17.5	32.94	47.17	46.241	62.11	00.58	28.24
27.4	33.19	43.35	46.406	61.92	00.89	25.88
Nov. 6.4	33.55	39.64	46.618	62.07	01.32	23.88
16.4	34.01	36.15	46.875	62.60	01.85	22.33
26.3	34.56	32.95	47.171	63.50	02.46	21.30
Dec. 6.3	35.19	30.14	47.499	64.77	03.14	20.86
16.3	35.89	27.81	47.851	66.38	03.85	21.02
26.3	36.64	26.02	48.214	68.29	04.61	21.80
36.2	37.41	24.84	48.578	70.43	05.35	23.17
Mean Place	32.860	66.03	45.478	55.10	02.897	19.89
Sec δ , Tan δ	2.948	+2.773	1.086	-0.425	2.760	-2.572
a, a'	+2.6	-19.9	+3.1	-19.9	+3.6	-19.8
b, b'	-0.18	+0.1	+0.03	+0.1	+0.17	+0.1
Authority and Catalogue No.	B.J.	760	B.J.	761	B.J.	764

† Second transit, Mar. 31.

APPARENT PLACES OF STARS, 1931.

437

AT UPPER TRANSIT AT GREENWICH.

Name Mag. Spect.	γ Centauri <i>m.</i>		γ Virginis <i>m.</i>		ρ Virginis	
	2:38	Ao	2:91	Fo	4:95	Ao
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ^m 12 37	[°] ['] —48 34	^h ^m 12 38	[°] ['] —1 04	^h ^m 12 38	[°] ['] +10 36
Jan. 1:2	41°11'9	36°27'	09°34'0	16°35'	23°24'6	51°88'
11:2	41°57'2	38°27'	09°67'8	18°52'	23°59'0	49°80'
21:2	42°00'4	40°65'	10°00'3	20°59'	23°92'1	47°95'
31:2	42°40'3	43°34'	10°30'7	22°50'	24°23'0	46°39'
Feb. 10:1	42°76'1	46°26'	10°58'0	24°19'	24°51'0	45°15'
20:1	43°07'0	49°34'	10°81'9	25°62'	24°75'4	44°25'
Mar. 2:1	43°32'8	52°49'	11°01'9	26°78'	24°95'9	43°70'
12:1	43°53'3	55°64'	11°18'0	27°67'	25°12'3	43°49'
22:0	43°68'4	58°73'	11°30'2	28°28'	25°24'7	43°57'
Apr. 1:0	43°78'5	61°71'	11°38'7	28°65'	25°33'3	43°91'
10:9	43°83'8	64°50'	11°43'9	28°79'	25°38'3	44°47'
20:9	43°84'6	67°08'	11°46'0	28°74'	25°40'2	45°18'
30:9	43°81'4	69°40'	11°45'6	28°52'	25°39'4	46°01'
May 10:9	43°74'6	71°42'	11°42'9	28°18'	25°36'3	46°90'
20:9	43°64'6	73°11'	11°38'4	27°74'	25°31'3	47°81'
30:8	43°51'7	74°43'	11°32'3	27°23'	25°24'7	48°70'
June 9:8	43°36'3	75°40'	11°24'9	26°68'	25°16'8	49°53'
19:8	43°19'0	75°95'	11°16'6	26°10'	25°08'1	50°28'
29:8	43°00'3	76°10'	11°07'6	25°51'	24°98'7	50°92'
July 9:7	42°80'6	75°84'	10°98'2	24°94'	24°88'9	51°43'
19:7	42°60'6	75°19'	10°88'6	24°40'	24°79'2	51°80'
29:7	42°41'0	74°16'	10°79'4	23°91'	24°69'8	52°01'
Aug. 8:6	42°22'6	72°79'	10°70'8	23°49'	24°61'1	52°05'
18:6	42°06'3	71°12'	10°63'3	23°17'	24°53'6	51°89'
28:6	41°92'8	69°21'	10°57'5	22°97'	24°47'6	51°54'
Sept. 7:6	41°83'2	67°14'	10°53'7	22°92'	24°43'9	50°97'
17:5	41°78'3	64°98'	10°52'7	23°05'	24°42'9	50°18'
27:5	41°788	62°83'	10°55'0	23°38'	24°45'0	49°15'
Oct. 7:5	41°85'3	60°76'	10°60'9	23°95'	24°50'9	47°87'
17:5	41°98'3	58°90'	10°71'0	24°77'	24°60'8	46°35'
27:4	42°18'0	57°32'	10°85'4	25°85'	24°75'2	44°60'
Nov. 6:4	42°44'1	56°11'	11°04'2	27°20'	24°93'9	42°63'
16:4	42°76'3	55°33'	11°27'3	28°80'	25°16'8	40°49'
26:3	43°13'7	55°04'	11°54'2	30°63'	25°43'7	38°21'
Dec. 6:3	43°55'3	55°27'	11°84'3	32°64'	25°73'9	35°84'
16:3	43°99'9	56°02'	12°16'8	34°78'	26°06'5	33°47'
26:3	44°46'0	57°28'	12°50'6	36°99'	26°40'7	31°14'
36:2	44°92'2	59°02'	12°84'9	39°21'	26°75'3	28°95'
Mean Place	42°07'9	51°38'	09°68'2	16°05'	23°47'4	56°31'
Sec δ, Tan δ	1°51'2	—1°13'4	1°00'0	—0°01'9	1°01'7	+0°18'7
<i>a</i> , <i>a'</i>	+3.3	—19.8	+3.1	—19.8	+3.0	—19.8
<i>b</i> , <i>b'</i>	+0.07	+0.2	0.00	+0.2	—0.01	+0.2
Authority and Catalogue No.	B.J.	768	A.N.	769	N.A.	770

No. 769. The reductions from mean to brighter star vary during the year from +0.130, —2.37 to +0.131, —2.36. The signs should be changed for reductions from mean to fainter star.

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name	β Muscæ m.			β Crucis			35 Virginis		
	Mag. Spect.			1.50			6.66		
Mean Solar Date	3.26		B ₃	B ₁			Ma		
	R.A.		Dec.	R.A.		Dec.	R.A.		Dec.
	^h 12	^m 41	[°] —67 43	^h 12	^m 43	[°] —59 18	^h 12	^m 44	[°] + 3 56
Jan. 1.3	59.95	71	31.33	39.196	556	24.99	20.185	341	54.84
11.2	60.66	67	32.95	39.752	532	26.75	20.526	329	52.69
21.2	61.33	62	35.08	40.284	494	28.98	20.855	308	50.70
31.2	61.95	56	37.67	40.778	444	31.60	21.163	279	48.93
Feb. 10.1	62.51	49	40.63	41.222	386	34.55	21.442	246	47.42
20.1	63.00	41	43.89	41.608	322	37.74	21.688	207	46.21
Mar. 2.1	63.41	32	47.36	41.930	257	41.09	21.895	168	45.31
12.1	63.73	22	50.96	42.187	190	44.52	22.063	129	44.71
22.0	63.95	14	54.61	42.377	125	47.95	22.192	92	44.39
Apr. 1.0	64.09	6	58.23	42.502	64	51.32	22.284	58	44.33
10.9	64.15	2	61.75	42.566	5	54.56	22.342	26	44.50
20.9	64.13	10	65.09	42.571	50	57.61	22.368	1	44.85
30.9	64.03	17	68.20	42.521	100	60.41	22.369	23	45.34
May 10.9	63.86	23	71.01	42.421	146	62.92	22.346	42	45.94
20.9	63.63	28	73.47	42.275	186	65.08	22.304	58	46.60
30.8	63.35	34	75.53	42.089	222	66.86	22.246	72	47.30
June 9.8	63.01	38	77.15	41.867	250	68.23	22.174	82	47.98
19.8	62.63	41	78.29	41.617	273	69.15	22.092	89	48.65
29.8	62.22	43	78.94	41.344	286	69.60	22.003	95	49.28
July 9.7	61.79	43	79.08	41.058	292	69.59	21.908	96	49.85
19.7	61.36	42	78.70	40.766	287	69.12	21.812	94	50.32
29.7	60.94	39	77.83	40.479	272	68.19	21.718	88	50.70
Aug. 8.7	60.55	36	76.48	40.207	244	66.84	21.630	77	50.96
18.6	60.19	31	74.71	39.963	206	65.12	21.553	63	51.09
28.6	59.88	23	72.57	39.757	155	63.07	21.490	41	51.06
Sept. 7.6	59.65	14	70.15	39.602	94	60.78	21.449	15	50.85
17.5	59.51	5	67.52	39.508	22	58.33	21.434	16	50.44
27.5	59.46	6	64.78	39.486	56	55.82	21.450	53	49.80
Oct. 7.5	59.52	17	62.06	39.542	140	53.35	21.503	95	48.93
17.5	59.69	28	59.46	39.682	226	51.02	21.598	138	47.81
27.4	59.97	39	57.09	39.908	308	48.95	21.736	182	46.44
Nov. 6.4	60.36	49	55.06	40.216	385	47.23	21.918	225	44.83
16.4	60.85	58	53.46	40.601	452	45.94	22.143	264	43.00
26.4	61.43	65	52.37	41.053	506	45.15	22.407	297	40.97
Dec. 6.3	62.08	69	51.85	41.559	544	44.90	22.704	323	38.80
16.3	62.77	72	51.92	42.103	564	45.23	23.027	338	36.55
26.3	63.49	72	52.60	42.667	566	46.12	23.365	343	34.29
36.2	64.21		53.87	43.233		47.56	23.708		32.07
Mean Place	61.717		50.25	40.537		42.34	20.514		57.15
Sec δ , Tan δ	2.639		—2.442	1.959		—1.685	1.002		+0.069
a, a'	+3.7		—19.7	+3.5		—19.7	+3.1		—19.7
b, b'	+0.16		+0.2	+0.11		+0.2	0.00		+0.2
Authority and Catalogue No.	A.N.		773	B.J.		775	N.A.		776

APPARENT PLACES OF STARS, 1931.

439

AT UPPER TRANSIT AT GREENWICH.

Name Mag. Spect.	31 Comæ		ψ Virginis		ε Ursæ Majoris	
	5.07	Go	4.91	Mb	1.68	Aop
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 12 ^m 48	[°] +27 ['] 54	^h 12 ^m 50	[°] - 9 ['] 09	^h 12 ^m 50	[°] +56 ['] 19
Jan. 1.3	20.208 ^s 369	46.53 ["] 190	45.178 ^s 344	50.10 ["] 219	60.276 ^s 516	45.61 ["] 138
11.2	20.577 ^s 358	44.63 ["] 150	45.522 ^s 333	52.29 ["] 217	60.792 ^s 507	44.23 ["] 78
21.2	20.935 ^s 339	43.13 ["] 105	45.855 ^s 312	54.46 ["] 210	61.299 ^s 483	43.45 ["] 16
31.2	21.274 ^s 308	42.08 ["] 58	46.167 ^s 284	56.56 ["] 195	61.782 ^s 443	43.29 ["] 45
Feb. 10.1	21.582 ^s 272	41.50 ["] 13	46.451 ^s 250	58.51 ["] 178	62.225 ^s 390	43.74 ["] 103
20.1	21.854 ^s 230	41.37 ["] 32	46.701 ^s 213	60.29 ["] 156	62.615 ^s 328	44.77 ["] 155
Mar. 2.1	22.084 ^s 185	41.69 ["] 71	46.914 ^s 175	61.85 ["] 133	62.943 ^s 259	46.32 ["] 199
12.1	22.269 ^s 141	42.40 ["] 106	47.089 ^s 137	63.18 ["] 109	63.202 ^s 187	48.31 ["] 232
22.0	22.410 ^s 96	43.46 ["] 132	47.226 ^s 100	64.27 ["] 85	63.389 ^s 113	50.63 ["] 255
Apr. 1.0	22.506 ^s 56	44.78 ["] 152	47.326 ^s 67	65.12 ["] 62	63.502 ^s 44	53.18 ["] 268
10.9	22.562 ^s 18	46.30 ["] 164	47.393 ^s 36	65.74 ["] 42	63.546 ^s 21	55.86 ["] 268
20.9	22.580 ^s 14	47.94 ["] 167	47.429 ^s 10	66.16 ["] 23	63.525 ^s 80	58.54 ["] 258
30.9	22.566 ^s 42	49.61 ["] 164	47.439 ^s 14	66.39 ["] 6	63.445 ^s 132	61.12 ["] 239
May 10.9	22.524 ^s 66	51.25 ["] 154	47.425 ^s 35	66.45 ["] 8	63.313 ^s 174	63.51 ["] 211
20.9	22.458 ^s 86	52.79 ["] 138	47.390 ^s 52	66.37 ["] 21	63.139 ^s 209	65.62 ["] 176
30.8	22.372 ^s 100	54.17 ["] 119	47.338 ^s 67	66.16 ["] 32	62.930 ^s 236	67.38 ["] 137
June 9.8	22.272 ^s 112	55.36 ["] 95	47.271 ^s 80	65.84 ["] 42	62.694 ^s 254	68.75 ["] 92
19.8	22.160 ^s 120	56.31 ["] 68	47.191 ^s 88	65.42 ["] 49	62.440 ^s 265	69.67 ["] 46
29.8	22.040 ^s 123	56.99 ["] 40	47.103 ^s 96	64.93 ["] 56	62.175 ^s 269	70.13 ["] 2
July 9.7	21.917 ^s 124	57.39 ["] 10	47.007 ^s 99	64.37 ["] 60	61.906 ^s 265	70.11 ["] 50
19.7	21.793 ^s 121	57.49 ["] 20	46.908 ^s 98	63.77 ["] 63	61.641 ^s 254	69.61 ["] 98
29.7	21.672 ^s 113	57.29 ["] 52	46.810 ^s 94	63.14 ["] 62	61.387 ^s 237	68.63 ["] 144
Aug. 8.7	21.559 ^s 99	56.77 ["] 83	46.716 ^s 85	62.52 ["] 60	61.150 ^s 212	67.19 ["] 187
18.6	21.460 ^s 83	55.94 ["] 113	46.631 ^s 69	61.92 ["] 54	60.938 ^s 180	65.32 ["] 227
28.6	21.377 ^s 60	54.81 ["] 142	46.562 ^s 49	61.38 ["] 45	60.758 ^s 142	63.05 ["] 263
Sept. 7.6	21.317 ^s 30	53.39 ["] 172	46.513 ^s 22	60.93 ["] 31	60.616 ^s 95	60.42 ["] 295
17.5	21.287 ^s 3	51.67 ["] 198	46.491 ^s 11	60.62 ["] 15	60.521 ^s 42	57.47 ["] 322
27.5	21.290 ^s 43	49.69 ["] 224	46.502 ^s 49	60.47 ["] 8	60.479 ^s 16	54.25 ["] 342
Oct. 7.5	21.333 ^s 87	47.45 ["] 246	46.551 ^s 91	60.55 ["] 31	60.495 ^s 81	50.83 ["] 358
17.5	21.420 ^s 133	44.99 ["] 264	46.642 ^s 136	60.86 ["] 58	60.576 ^s 150	47.25 ["] 366
27.4	21.553 ^s 181	42.35 ["] 277	46.778 ^s 182	61.44 ["] 88	60.726 ^s 219	43.59 ["] 364
Nov. 6.4	21.734 ^s 228	39.58 ["] 285	46.960 ^s 225	62.32 ["] 116	60.945 ^s 288	39.95 ["] 356
16.4	21.962 ^s 272	36.73 ["] 286	47.185 ^s 267	63.48 ["] 145	61.233 ^s 352	36.39 ["] 337
26.4	22.234 ^s 310	33.87 ["] 280	47.452 ^s 300	64.93 ["] 170	61.585 ^s 411	33.02 ["] 309
Dec. 6.3	22.544 ^s 339	31.07 ["] 264	47.752 ^s 325	66.63 ["] 191	61.996 ^s 457	29.93 ["] 272
16.3	22.883 ^s 360	28.43 ["] 243	48.077 ^s 341	68.54 ["] 207	62.453 ^s 491	27.21 ["] 226
26.3	23.243 ^s 369	26.00 ["] 212	48.418 ^s 348	70.61 ["] 216	62.944 ^s 511	24.95 ["] 174
36.2	23.612 ^s	23.88 ["]	48.766 ^s	72.77 ["]	63.455 ^s	23.21 ["]
Mean Place	20.314	56.97	45.674	52.22	59.919	63.11
Sec δ, Tan δ	1.132	+0.530	1.013	-0.161	1.804	+1.501
a, a'	+2.9	-19.6	+3.1	-19.6	+2.6	-19.6
b, b'	-0.03	+0.2	+0.01	+0.2	-0.10	+0.2
Authority and Catalogue No.	N.A.	778	N.A.	781	B.J.	782

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name Mag. Spect.	♌ Virginis		♊ Canum Venat.		♏ Muscæ	
	3.66	Ma	2.90	Aop	3.63	152
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 12 52	^m 340	^h 12 52	^m 340	^h 12 57	^m 340
Jan. 1.3	07.188	77.17	48.139	72.54	27.44	19.20
11.2	07.528	75.01	48.539	70.82	28.28	20.50
21.2	07.858	73.01	48.931	69.56	29.07	22.47
31.2	08.169	71.23	49.303	68.82	29.81	24.83
Feb. 10.1	08.453	69.70	49.644	68.62	30.49	27.60
20.1	08.703	68.47	49.945	68.95	31.09	30.72
Mar. 2.1	08.916	67.55	50.199	69.76	31.60	34.10
12.1	09.090	66.93	50.404	71.00	32.01	37.65
22.0	09.225	66.61	50.558	72.58	32.33	41.30
Apr. 1.0	09.324	66.55	50.661	74.44	32.54	44.97
10.9	09.388	66.72	50.717	76.48	32.65	48.57
20.9	09.422	67.07	50.729	78.60	32.67	52.04
30.9	09.429	67.56	50.703	80.71	32.59	55.31
May 10.9	09.412	68.16	50.642	82.73	32.43	58.32
20.9	09.374	68.83	50.553	84.58	32.19	61.01
30.8	09.320	69.53	50.441	86.20	31.87	63.32
June 9.8	09.251	70.23	50.311	87.54	31.49	65.20
19.8	09.171	70.90	50.168	88.56	31.05	66.61
29.8	09.082	71.53	50.014	89.23	30.57	67.53
July 9.7	08.987	72.10	49.857	89.53	30.06	67.04
19.7	08.889	72.59	49.699	89.45	29.54	67.81
29.7	08.791	72.97	49.547	88.98	29.02	67.17
Aug. 8.7	08.698	73.24	49.404	88.13	28.52	66.03
18.6	08.615	73.38	49.275	86.91	28.07	64.43
28.6	08.546	73.35	49.166	85.33	27.67	62.42
Sept. 7.6	08.497	73.15	49.084	83.42	27.35	60.07
17.5	08.473	72.75	49.033	81.19	27.13	57.47
27.5	08.481	72.13	49.020	78.68	27.02	54.72
Oct. 7.5	08.526	71.29	49.051	75.93	27.04	51.02
17.5	08.611	70.19	49.130	72.98	27.19	49.10
27.4	08.740	68.84	49.261	69.88	27.47	46.64
Nov. 6.4	08.914	67.24	49.444	66.69	27.88	44.30
16.4	09.132	65.42	49.679	63.49	28.41	42.53
26.4	09.390	63.41	49.963	60.35	29.05	41.15
Dec. 6.3	09.682	61.25	50.291	57.36	29.77	40.32
16.3	10.001	59.00	50.653	54.61	30.56	40.08
26.3	10.337	56.72	51.039	52.17	31.38	40.45
36.2	10.679	54.50	51.437	50.14	32.22	41.42
Mean Place	07.565	79.71	48.138	86.23	29.789	38.05
Sec δ, Tan δ	1.002	+0.066	1.281	+0.801	3.099	-2.934
a, a'	+3.1	-19.5	+2.8	-19.5	+4.0	-19.4
b, b'	0.00	+0.2	-0.05	+0.2	+0.19	+0.2
Authority and Catalogue No.	B.J.	784	B.J.	786	A.N.	787

APPARENT PLACES OF STARS, 1931.

441

AT UPPER TRANSIT AT GREENWICH.

Name Mag. Spect.	ε Virginis		θ Virginis		γ Hydræ	
	2.95	Ko	4.46	Ao	3.33	G5
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ₁₂ ^m ₅₈	[°] ₊ ['] ₁₁ ["] ₁₉	^h ₁₃ ^m ₀₆	[°] ₋ ['] ₅ ["] ₁₀	^h ₁₃ ^m ₁₅	[°] ₋ ['] ₂₂ ["] ₄₈
Jan. 1.3	44.119 ^s 344	41.61 ["] 213	21.911 ^s 343	15.35 ["] 216	09.117 ^s 364	23.01 ["] 200
11.2	44.463 336	39.48 189	22.254 335	17.51 211	09.481 356	25.01 214
21.2	44.799 318	37.59 159	22.589 317	19.62 199	09.837 338	27.15 222
31.2	45.117 291	36.00 127	22.906 292	21.61 182	10.175 313	29.37 223
Feb. 10.2	45.408 258	34.73 90	23.198 260	23.43 160	10.488 280	31.60 219
20.1	45.666 222	33.83 55	23.458 225	25.03 136	10.768 245	33.79 209
Mar. 2.1	45.888 182	33.28 20	23.683 188	26.39 110	11.013 207	35.88 196
12.1	46.070 143	33.08 11	23.871 151	27.49 84	11.220 169	37.84 180
22.1	46.213 105	33.19 39	24.022 116	28.33 59	11.389 132	39.64 161
Apr. 1.0	46.318 70	33.58 62	24.138 82	28.92 37	11.521 98	41.25 142
10.9	46.388 38	34.20 80	24.220 51	29.29 16	11.619† 65	42.67 122
20.9	46.426 9	35.00 91	24.271 23	29.45 1	11.684 35	43.89 101
30.9	46.435 16	35.91 98	24.294 1	29.44 15	11.719 7	44.90 81
May 10.9	46.419 37	36.89 100	24.293 22	29.29 28	11.726 17	45.71 61
20.9	46.382 55	37.89 98	24.271 42	29.01 38	11.709 39	46.32 41
30.9	46.327 71	38.87 91	24.229 59	28.63 44	11.670 60	46.73 21
June 9.8	46.256 83	39.78 83	24.170 72	28.19 50	11.610 77	46.94 2
19.8	46.173 94	40.61 72	24.098 84	27.69 55	11.533 93	46.96 16
29.8	46.079 99	41.33 57	24.014 93	27.14 55	11.440 106	46.80 35
July 9.8	45.980 103	41.90 41	23.921 99	26.59 55	11.334 113	46.45 53
19.7	45.877 103	42.31 24	23.822 101	26.04 54	11.221 118	45.92 67
29.7	45.774 98	42.55 6	23.721 98	25.50 50	11.103 118	45.25 81
Aug. 8.7	45.676 90	42.61 14	23.623 92	25.00 44	10.985 111	44.44 91
18.6	45.586 76	42.47 35	23.531 79	24.56 36	10.874 98	43.53 97
28.6	45.510 57	42.12 57	23.452 61	24.20 24	10.776 77	42.56 100
Sept. 7.6	45.453 31	41.55 81	23.391 35	23.96 9	10.699 51	41.56 96
17.6	45.422 —	40.74 105	23.356 4	23.87 10	10.648 16	40.60 88
27.5	45.422 36	39.69 130	23.352 32	23.97 30	10.632 25	39.72 74
Oct. 7.5	45.458 77	38.39 154	23.384 74	24.27 54	10.657 70	38.98 54
17.5	45.535 122	36.85 178	23.458 119	24.81 80	10.727 120	38.44 29
27.5	45.657 167	35.07 199	23.577 166	25.61 108	10.847 170	38.15 1
Nov. 6.4	45.824 211	33.08 218	23.743 210	26.69 134	11.017 220	38.16 34
16.4	46.035 253	30.90 232	23.953 252	28.03 159	11.237 265	38.50 67
26.4	46.288 289	28.58 240	24.205 288	29.62 181	11.502 304	39.17 102
Dec. 6.3	46.577 317	26.18 242	24.493 316	31.43 198	11.806 334	40.19 135
16.3	46.894 336	23.76 237	24.809 335	33.41 211	12.140 356	41.54 163
26.3	47.230 344	21.39 224	25.144 345	35.52 216	12.496 365	43.17 187
36.3	47.574	19.15	25.489	37.68	12.861	45.04
Mean Place	44.462	47.01	22.460	15.47	09.918	28.89
Sec δ, Tan δ	1.020	+0.200	1.004	-0.090	1.085	-0.421
a, a'	+3.0	-19.4	+3.1	-19.2	+3.3	-19.0
b, b'	-0.01	+0.3	+0.01	+0.3	+0.03	+0.3
Authority and Catalogue No.	B.J.	788	B.J.	792	B.J.	802

† First transit, Apr. 11.

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name	α Centauri		ζ Ursæ Majoris		α Virginis (<i>Spica</i>)	
	2·91	A2	2·40	A2p	1·21	B2
Mag. Spect.						
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 13 ^m 16	^s —36 [°] 20	^h 13 ^m 21	^s +55 [°] 16	^h 13 ^m 21	^s —10 [°] 48
Jan. 1·3	41·623 ^s	45·49 ["]	09·010	48·69	32·566	04·48
11·3	42·024	47·28	09·505	46·94	32·913	06·57
21·2	42·416	49·36	10·002	45·78	33·254	08·68
31·2	42·788	51·66	10·485	45·24	33·580	10·73
Feb. 10·2	43·132	54·11	10·938	45·34	33·882	12·67
20·1	43·441	56·64	11·348	46·04	34·155	14·45
Mar. 2·1	43·711	59·20	11·705	47·30	34·394	16·04
12·1	43·940	61·73	12·000	49·06	34·598	17·40
22·1	44·126	64·18	12·228	51·22	34·766	18·54
Apr. 1·0	44·272	66·50	12·388	53·68	34·898	19·46
11·0	44·378†	68·67	12·480	56·33	34·998	20·15
20·9	44·447	70·66	12·509	59·06	35·066	20·64
30·9	44·481	72·44	12·477	61·76	35·106	20·94
May 10·9	44·484	73·99	12·391	64·32	35·120	21·08
20·9	44·457	75·29	12·258	66·67	35·110	21·08
30·9	44·402	76·33	12·084	68·72	35·079	20·94
June 9·8	44·323	77·09	11·877	70·40	35·030	20·70
19·8	44·222	77·56	11·644	71·68	34·963	20·36
29·8	44·102	77·73	11·391	72·50	34·882	19·94
July 9·8	43·967	77·61	11·126	72·85	34·789	19·46
19·7	43·822	77·20	10·857	72·72	34·687	18·92
29·7	43·672	76·51	10·589	72·10	34·580	18·34
Aug. 8·7	43·523	75·56	10·331	71·01	34·473	17·75
18·7	43·382	74·39	10·089	69·47	34·371	17·16
28·6	43·256	73·04	09·872	67·49	34·280	16·62
Sept. 7·6	43·154	71·56	09·688	65·11	34·206	16·14
17·6	43·085	70·01	09·544	62·37	34·157	15·77
27·5	43·057	68·47	09·448	59·31	34·138	15·55
Oct. 7·5	43·075	67·01	09·407	55·99	34·156	15·51
17·5	43·147	65·71	09·430	52·47	34·216	15·69
27·5	43·275	64·63	09·519	48·82	34·323	16·12
Nov. 6·4	43·461	63·85	09·679	45·11	34·477	16·83
16·4	43·702	63·43	09·909	41·44	34·678	17·82
26·4	43·994	63·41	10·208	37·89	34·923	19·09
Dec. 6·4	44·330	63·80	10·569	34·57	35·206	20·62
16·3	44·700	64·61	10·984	31·57	35·520	22·37
26·3	45·092	65·82	11·440	28·98	35·855	24·30
36·3	45·494	67·40	11·924	26·88	36·201	26·34
Mean Place	42·646	55·58	08·995	66·81	33·263	05·99
Sec δ, Tan δ	1·242	—0·736	1·756	+1·443	1·018	—0·191
a, a'	+3·4	—18·9	+2·4	—18·8	+3·2	—18·8
b, b'	+0·05	+0·3	—0·09	+0·3	+0·01	+0·3
Authority and Catalogue No.	B. J.	803	B. J.	805	B. J.	806

† First transit, Apr. 11.

APPARENT PLACES OF STARS, 1931.

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AT UPPER TRANSIT AT GREENWICH.

Name	ι Virginis		ζ Virginis		ε Centauri	
Mag. Spect.	5.59	K2.	3.44	A2	2.56	B1
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ₁₃ ^m ₂₃	[°] _{—12} ['] ₂₀	^h ₁₃ ^m ₃₁	[°] _{—0} ['] ₁₄	^h ₁₃ ^m ₃₅	[°] _{—53} ['] ₀₆
Jan. 1.3	03.477 ^s 348	54.89 ["] 207	09.839 ^s 339	39.85 ["] 215	28.560 ^s 504	44.16 ["] 124
11.3	03.825 342	56.96 211	10.178 337	42.00 205	29.064 499	45.40 168
21.2	04.167 342	59.07 206	10.515 323	44.05 188	29.563 480	47.08 205
31.2	04.494 304	61.13 197	10.838 302	45.93 166	30.043 449	49.13 238
Feb. 10.2	04.798 275	63.10 183	11.140 275	47.59 140	30.492 410	51.51 264
20.1	05.073 241	64.93 165	11.415 243	48.99 112	30.902 364	54.15 282
Mar. 2.1	05.314 206	66.58 144	11.658 209	50.11 83	31.266 314	56.97 293
12.1	05.520 170	68.02 122	11.867 173	50.94 55	31.580 263	59.90 299
22.1	05.690 135	69.24 101	12.040 138	51.49 28	31.843 210	62.89 298
Apr. 1.0	05.825 101	70.25 78	12.178 104	51.77 4	32.053 159	65.87 290
11.0	05.926 70	71.03 58	12.282 74	51.81 17	32.212 108	68.77 280
20.9	05.996 42	71.61 40	12.356 45	51.64 33	32.320 59	71.57 263
30.9	06.038 16	72.01 22	12.401 19	51.31 35	32.379 13	74.20 242
May 10.9	06.054 9	72.23 8	12.420 5	50.86 55	32.392 32	76.62 217
20.9	06.045 30	72.31 7	12.415 26	50.31 62	32.360 74	78.79 188
30.9	06.015 50	72.24 17	12.389 46	49.69 64	32.286 114	80.67 155
June 9.8	05.965 66	72.07 30	12.343 63	49.05 64	32.172 149	82.22 119
19.8	05.899 82	71.77 38	12.280 78	48.41 63	32.023 180	83.41 81
29.8	05.817 94	71.39 48	12.202 90	47.78 60	31.843 206	84.22 41
July 9.8	05.723 103	70.91 54	12.112 100	47.18 54	31.637 225	84.63 1
19.7	05.620 108	70.37 58	12.012 106	46.64 48	31.412 235	84.62 41
29.7	05.512 109	69.79 62	11.906 108	46.16 39	31.177 238	84.21 81
Aug. 8.7	05.403 104	69.17 62	11.798 104	45.77 28	30.939 230	83.40 119
18.7	05.299 93	68.55 59	11.694 95	45.49 15	30.709 210	82.21 151
28.6	05.206 76	67.96 54	11.599 80	45.34 1	30.499 179	80.70 179
Sept. 7.6	05.130 51	67.42 45	11.519 57	45.33 17	30.320 137	78.91 201
17.6	05.079 21	66.97 31	11.462 28	45.50 36	30.183 84	76.90 213
27.5	05.058 17	66.66 13	11.434 6	45.86 58	30.099 20	74.77 219
Oct. 7.5	05.075 59	66.53 9	11.440 47	46.44 81	30.079 50	72.58 212
17.5	05.134 106	66.62 34	11.487 92	47.25 106	30.129 124	70.46 198
27.5	05.240 153	66.96 61	11.579 138	48.31 132	30.253 202	68.48 173
Nov. 6.4	05.393 201	67.57 90	11.717 185	49.63 155	30.455 276	66.75 140
16.4	05.594 244	68.47 118	11.902 229	51.18 178	30.731 344	65.35 100
26.4	05.838 284	69.65 145	12.131 269	52.96 196	31.075 404	64.35 54
Dec. 6.4	06.122 314	71.10 169	12.400 300	54.92 209	31.479 452	63.81 5
16.3	06.436 336	72.79 188	12.700 324	57.01 217	31.931 485	63.76 44
26.3	06.772 347	74.67 201	13.024 337	59.18 217	32.416 503	64.20 94
36.3	07.119	76.68	13.361	61.35	32.919	65.14
Mean Place	04.199	56.88	10.482	37.32	30.188	57.74
Sec δ, Tan δ	1.024	—0.219	1.000	—0.004	1.666	—1.333
a, a'	+3.2	—18.7	+3.1	—18.5	+3.8	—18.3
b, b'	+0.01	+0.4	0.00	+0.4	+0.08	+0.4
Authority and Catalogue No.	N.A.	807	B.J.	814	B.J.	819

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name	<i>m</i> Virginis		<i>r</i> Bootis		<i>η</i> Ursæ Majoris	
Mag. Spect.	5·16	Ma.	4·51	F5	1·91	B3
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 13 ^m 37	^s —8 21	^h 13 ^m 43	^s +17 47	^h 13 ^m 44	^s +49 38
Jan. 1·3	58 ^s ·454	19°34'	58 ^s ·375	51°22'	49°079	68°45'
11·3	58·797 343	21·40 206	58·718 343	48·98 224	49·519 440	66·36 209
21·2	59·138 341	23·45 205	59·062 344	47·02 196	49·966 447	64·82 154
31·2	59·466 328	25·42 197	59·397 335	45·42 160	50·406 440	63·88 94
Feb. 10·2	59·774 308	27·26 184	59·714 317	44·21 121	50·825 419	63·56 32
	282	167	290	79	386	29
20·2	60·056	28·93	60·004	43·42	51·211	63·85
Mar. 2·1	60·306 250	30·38 145	60·263 259	43·05 37	51·555 344	64·72 87
12·1	60·523 217	31·60 122	60·487 224	43·09 4	51·849 294	66·12 140
22·1	60·706 183	32·58 98	60·674 187	43·51 42	52·088 239	67·96 184
Apr. 1·0	60·854 148	33·32 74	60·824 150	44·26 75	52·270 182	70·16 220
	116	52	114	101	123	245
11·0	60·970	33·84	60·938	45·27	52·393	72·61
20·9	61·054 84	34·15 31	61·018 80	46·48 121	52·461 68	75·21 260
30·9	61·109 55	34·30 15	61·066 48	47·84 136	52·477 16	77·85 264
May 10·9	61·138 29	34·28 2	61·084 18	49·26 142	52·443 34	80·44 259
20·9	61·142 4	34·14 14	61·076 8	50·68 142	52·365 78	82·88 244
	19	25	33	138	116	219
30·9	61·123	33·89	61·043	52·06	52·249	85·07
June 9·9	61·084 39	33·56 33	60·988 55	53·34 128	52·098 151	86·06 189
19·8	61·025 59	33·15 41	60·915 73	54·48 114	51·920 178	88·49 153
29·8	60·950 75	32·68 47	60·825 90	55·46 98	51·718 202	89·63 114
July 9·8	60·861 89	32·18 50	60·720 105	56·22 76	51·500 218	90·32 69
	101	52	115	55	230	24
19·7	60·760	31·66	60·605	56·77	51·270	90·56
29·7	60·652 108	31·13 53	60·483 122	57·07 30	51·036 234	90·34 22
Aug. 8·7	60·541 111	30·60 53	60·359 124	57·12 5	50·803 233	89·65 69
18·7	60·433 108	30·12 48	60·237 122	56·90 22	50·578 225	88·51 114
28·6	60·333 100	29·68 44	60·123 114	56·42 48	50·370 208	86·93 158
	85	35	99	76	185	200
Sept. 7·6	60·248	29·33	60·024	55·66	50·185	84·93
17·6	60·185 63	29·09 24	59·946 78	54·63 103	50·032 153	82·55 238
27·6	60·152 33	29·00 9	59·896 50	53·32 131	49·919 113	79·82 273
Oct. 7·5	60·154 2	29·10 10	59·881 15	51·73 159	49·853 66	76·79 303
17·5	60·197 43	29·42 32	59·907 26	49·88 185	49·842 11	73·50 329
	89	56	70	209	50	348
27·5	60·286	29·98	59·977	47·79	49·892	70·02
Nov. 6·4	60·423 137	30·79 81	60·096 119	45·49 230	50·005 113	66·43 359
16·4	60·607 184	31·87 108	60·263 167	43·01 248	50·184 179	62·80 363
26·4	60·836 229	33·22 135	60·477 214	40·41 260	50·426 242	59·23 357
Dec. 6·4	61·105 269	34·79 157	60·734 257	37·75 266	50·728 302	55·80 343
	303	179	292	265	355	318
16·3	61·408	36·58	61·026	35·10	51·083	52·62
26·3	61·734 326	38·51 193	61·346 320	32·54 256	51·479 396	49·79 283
36·3	62·074 340	40·54 203	61·684 338	30·16 238	51·906 427	47·40 239
Mean Place	59·219	19·35	58·934	60·21	49·375	85·95
Sec δ, Tan δ	1·011	—0·147	1·050	+0·321	1·545	+1·177
<i>a</i> , <i>a'</i>	+3·2	—18·2	+2·9	—18·0	+2·4	—18·0
<i>b</i> , <i>b'</i>	+0·01	+0·4	—0·02	+0·4	—0·07	+0·4
Authority and Catalogue No.	N.A.	821	B.J.	824	B.J.	826

APPARENT PLACES OF STARS, 1931.

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AT UPPER TRANSIT AT GREENWICH.

Name Mag. Spect.	μ Centauri		ζ Centauri		η Bootis	
	3.32	B2p	3.06	B2p	2.80	Go
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ₁₃ ^m ₄₅	[°] ₋₄₂ ['] ₀₇	^h ₁₃ ^m ₅₁	[°] ₋₄₆ ['] ₅₆	^h ₁₃ ^m ₅₁	[°] ₊₁₈ ['] ₄₄
Jan. 1.3	^s _{25.707} 428	^s _{40.00} 139	^s _{11.930} 456	^s _{46.06} 121	^s _{23.283} 343	^s _{25.04} 229
11.3	_{26.135} 425	_{41.39} 172	_{12.386} 455	_{47.27} 159	_{23.626} 346	_{22.75} 199
21.2	_{26.560} 411	_{43.11} 202	_{12.841} 441	_{48.86} 193	_{23.972} 337	_{20.76} 162
31.2	_{26.971} 388	_{45.13} 224	_{13.282} 418	_{50.79} 220	_{24.309} 321	_{19.14} 123
Feb. 10.2	_{27.359} 356	_{47.37} 241	_{13.700} 385	_{52.99} 242	_{24.630} 296	_{17.91} 80
20.2	_{27.715} 320	_{49.78} 251	_{14.085} 347	_{55.41} 256	_{24.926} 266	_{17.11} 36
Mar. 2.1	_{28.035} 279	_{52.29} 255	_{14.432} 305	_{57.97} 265	_{25.192} 231	_{16.75} 6
12.1	_{28.314} 237	_{54.84} 254	_{14.737} 261	_{60.62} 268	_{25.423} 195	_{16.81} 44
22.1	_{28.551} 195	_{57.38} 249	_{14.998} 215	_{63.30} 266	_{25.618} 158	_{17.25} 78
Apr. 1.1	_{28.746} 154	_{59.87} 238	_{15.213} 171	_{65.96} 259	_{25.776} 121	_{18.03} 105
11.0	_{28.900} 113	_{62.25} 226	_{15.384} 127	_{68.55} 248	_{25.897} 88	_{19.08} 127
20.9	_{29.013} 74	_{64.51} 209	_{15.511} 85	_{71.03} 233	_{25.985} 55	_{20.35} 140
30.9	_{29.087} 37	_{66.60} 189	_{15.596} 43	_{73.36} 214	_{26.040} 25	_{21.75} 148
May 10.9	_{29.124} 2	_{68.49} 167	_{15.639} 3	_{75.50} 193	_{26.065} 2	_{23.23} 149
20.9	_{29.126} 33	_{70.16} 142	_{15.642} 35	_{77.43} 167	_{26.063} 27	_{24.72} 143
30.9	_{29.093} 65	_{71.58} 114	_{15.607} 71	_{79.10} 138	_{26.036} 50	_{26.15} 133
June 9.9	_{29.028} 94	_{72.72} 85	_{15.536} 105	_{80.48} 107	_{25.986} 71	_{27.48} 119
19.8	_{28.934} 120	_{73.57} 54	_{15.431} 136	_{81.55} 75	_{25.915} 89	_{28.67} 102
29.8	_{28.814} 143	_{74.11} 22	_{15.295} 160	_{82.30} 39	_{25.826} 104	_{29.69} 80
July 9.8	_{28.671} 160	_{74.33} 11	_{15.135} 181	_{82.69} 3	_{25.722} 116	_{30.49} 56
19.8	_{28.511} 172	_{74.22} 43	_{14.954} 195	_{82.72} 33	_{25.606} 123	_{31.05} 32
29.7	_{28.339} 177	_{73.79} 73	_{14.759} 201	_{82.39} 67	_{25.483} 128	_{31.37} 6
Aug. 8.7	_{28.162} 174	_{73.06} 102	_{14.558} 199	_{81.72} 100	_{25.355} 126	_{31.43} 22
18.7	_{27.988} 161	_{72.04} 127	_{14.359} 186	_{80.72} 130	_{25.229} 119	_{31.21} 50
28.6	_{27.827} 140	_{70.77} 148	_{14.173} 163	_{79.42} 155	_{25.110} 105	_{30.71} 78
Sept. 7.6	_{27.687} 108	_{69.29} 162	_{14.010} 129	_{77.87} 173	_{25.005} 84	_{29.93} 106
17.6	_{27.579} 68	_{67.67} 169	_{13.881} 85	_{76.14} 185	_{24.921} 57	_{28.87} 135
27.6	_{27.511} 18	_{65.98} 169	_{13.796} 32	_{74.29} 190	_{24.864} 24	_{27.52} 163
Oct. 7.5	_{27.493} 38	_{64.29} 161	_{13.764} 29	_{72.39} 184	_{24.840} 18	_{25.89} 189
17.5	_{27.531} 100	_{62.68} 145	_{13.793} 95	_{70.55} 170	_{24.858} 63	_{24.00} 214
27.5	_{27.631} 163	_{61.23} 120	_{13.888} 164	_{68.85} 148	_{24.921} 111	_{21.86} 236
Nov. 6.5	_{27.794} 226	_{60.03} 90	_{14.052} 233	_{67.37} 118	_{25.032} 160	_{19.50} 253
16.4	_{28.020} 284	_{59.13} 52	_{14.285} 296	_{66.19} 82	_{25.192} 207	_{16.97} 265
26.4	_{28.304} 335	_{58.61} 12	_{14.581} 352	_{65.37} 40	_{25.399} 251	_{14.32} 272
Dec. 6.4	_{28.639} 378	_{58.49} 31	_{14.933} 398	_{64.97} 4	_{25.650} 289	_{11.60} 270
16.3	_{29.017} 408	_{58.80} 73	_{15.331} 432	_{65.01} 49	_{25.939} 318	_{08.90} 260
26.3	_{29.425} 425	_{59.53} 114	_{15.763} 453	_{65.50} 94	_{26.257} 336	_{06.30} 242
36.3	_{29.850}	_{60.67}	_{16.216}	_{66.44}	_{26.593}	_{03.88}
Mean Place	27.064	50.31	13.466	57.31	23.880	34.53
Sec δ , Tan δ	1.348	-0.905	1.465	-1.070	1.056	+0.339
a, a'	+3.6	-18.0	+3.7	-17.7	+2.9	-17.7
b, b'	+0.05	+0.4	+0.06	+0.5	-0.02	+0.5
Authority and Catalogue No.	A.N.	828	B.J.	831	B.J.	832

† Second transit, Apr. 20.

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name	τ Virginis		β Centauri		π Hydræ	
Mag. Spect.	4.34	A2	0.86	Br	3.48	Ko
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 13 58	^m + 1 52	^h 13 58	^m - 60 02	^h 14 02	^m - 20 20
Jan. 1.3	07.161 ³³⁵	35.87 ²¹⁵	53.98 ⁵⁸	13.89 ⁷⁶	25.005 ³⁶⁸	57.15 ¹⁶¹
11.3	07.406 ³³⁷	33.72 ²⁰³	54.56 ⁵⁹	14.65 ¹²⁴	25.373 ³⁷⁰	58.76 ¹⁸⁰
21.2	07.833 ³²⁹	31.69 ¹⁸⁵	55.15 ⁵⁷	15.89 ¹⁶⁹	25.743 ³⁶¹	60.56 ¹⁹³
31.2	08.162 ³¹³	29.84 ¹⁶¹	55.72 ⁵⁴	17.58 ²⁰⁸	26.104 ³⁴³	62.49 ²⁰⁰
Feb. 10.2	08.475 ²⁹⁰	28.23 ¹³⁴	56.26 ⁵¹	19.66 ²⁴¹	26.447 ³²⁰	64.49 ²⁰¹
20.2	08.765 ²⁶¹	26.89 ¹⁰³	56.77 ⁴⁶	22.07 ²⁶⁸	26.767 ²⁹⁰	66.50 ¹⁹⁸
Mar. 2.1	09.026 ²³⁰	25.86 ⁷²	57.23 ⁴¹	24.75 ²⁸⁷	27.057 ²⁵⁷	68.48 ¹⁹⁰
12.1	09.256 ¹⁹⁷	25.14 ⁴²	57.64 ³⁵	27.62 ³⁰¹	27.314 ²²³	70.38 ¹⁸⁰
22.1	09.453 ¹⁶⁴	24.72 ¹⁴	57.99 ²⁹	30.63 ³⁰⁸	27.537 ¹⁸⁸	72.18 ¹⁶⁶
Apr. 1.1	09.617 ¹³¹	24.58 ¹²	58.28 ²³	33.71 ³⁰⁷	27.725 ¹⁵⁵	73.84 ¹⁵¹
11.0	09.748 ¹⁰¹	24.70 ³²	58.51 ¹⁷	36.78 ³⁰³	27.880 ¹²¹	75.35 ¹³⁶
21.0	09.849 ⁷¹	25.02 ⁵⁰	58.68 ¹⁰	39.81 ²⁹²	28.001 ⁸⁹	76.71 ¹¹⁹
30.9	09.920 ⁴³	25.52 ⁶²	58.78 ⁵	42.73 ²⁷⁷	28.090 ⁵⁸	77.90 ¹⁰²
May 10.9	09.963 ¹⁸	26.14 ⁷¹	58.83 ¹	45.50 ²⁵⁵	28.148 ²⁹	78.92 ⁸⁴
20.9	09.981 ⁷	26.85 ⁷⁶	58.82 ⁷	48.05 ²²⁸	28.177 [—]	79.76 ⁶⁶
30.9	09.974 ²⁹	27.61 ⁷⁷	58.75 ¹²	50.33 ¹⁹⁸	28.177 ²⁶	80.42 ⁴⁹
June 9.9	09.945 ⁵⁰	28.38 ⁷⁶	58.63 ¹⁶	52.31 ¹⁶²	28.151 ⁵²	80.91 ³⁰
19.8	09.895 ⁶⁹	29.14 ⁷³	58.47 ²¹	53.93 ¹²⁴	28.099 ⁷⁶	81.21 ¹²
29.8	09.826 ⁸⁵	29.87 ⁶⁵	58.26 ²⁵	55.17 ⁸²	28.023 ¹¹⁶	81.33 ⁷
July 9.8	09.741 ⁹⁹	30.52 ⁵⁸	58.01 ²⁸	55.99 ³⁹	27.927 ¹¹⁴	81.26 ²⁶
19.8	09.642 ¹⁰⁹	31.10 ⁴⁸	57.73 ³⁰	56.38 ⁷	27.813 ¹²⁷	81.00 ⁴³
29.7	09.533 ¹¹⁵	31.58 ³⁶	57.43 ³¹	56.31 ⁵²	27.686 ¹³⁴	80.57 ⁵⁹
Aug. 8.7	09.418 ¹¹⁵	31.94 ²⁴	57.12 ³¹	55.79 ⁹⁴	27.552 ¹³⁶	79.98 ⁷³
18.7	09.303 ¹¹⁰	32.18 ¹⁰	56.81 ²⁹	54.85 ¹³⁵	27.416 ¹³⁰	79.25 ⁸⁵
28.6	09.193 ⁹⁸	32.28 ⁷	56.52 ²⁵	53.50 ¹⁷⁰	27.286 ¹¹⁶	78.40 ⁹³
Sept. 7.6	09.095 ⁷⁹	32.21 ²⁵	56.27 ²¹	51.80 ²⁰⁰	27.170 ⁹³	77.47 ⁹⁷
17.6	09.016 ⁵³	31.96 ⁴⁶	56.06 ¹⁵	49.80 ²²¹	27.077 ⁶³	76.50 ⁹⁵
27.6	08.963 ²⁰	31.50 ⁶⁷	55.91 ⁸	47.59 ²³⁵	27.014 ²⁴	75.55 ⁸⁹
Oct. 7.5	08.943 ²⁰	30.83 ⁹¹	55.83 ¹	45.24 ²³⁸	26.990 ²¹	74.66 ⁷⁶
17.5	08.963 ⁶⁴	29.92 ¹¹⁵	55.84 ¹⁰	42.86 ²³¹	27.011 ⁷²	73.90 ⁵⁷
27.5	09.027 ¹¹²	28.77 ¹³⁹	55.94 ¹⁹	40.55 ²¹³	27.083 ¹²⁵	73.33 ³⁴
Nov. 6.5	09.139 ¹⁵⁹	27.38 ¹⁶²	56.13 ²⁷	38.42 ¹⁸⁶	27.208 ¹⁷⁹	72.99 ⁶
16.4	09.298 ²⁰⁶	25.76 ¹⁸⁴	56.40 ³⁶	36.56 ¹⁵¹	27.387 ²³¹	72.93 ²⁵
26.4	09.504 ²⁴⁸	23.92 ²⁰¹	56.76 ⁴⁴	35.05 ¹⁰⁷	27.618 ²⁷⁷	73.18 ⁵⁷
Dec. 6.4	09.752 ²⁸⁴	21.91 ²¹²	57.20 ⁵⁰	33.98 ⁶⁰	27.895 ³¹⁶	73.75 ⁸⁸
16.3	10.036 ³¹¹	19.79 ²¹⁹	57.70 ⁵⁵	33.38 ⁹	28.211 ³⁴⁵	74.63 ¹¹⁹
26.3	10.347 ³²⁹	17.60 ²¹⁸	58.25 ⁵⁸	33.29 ⁴³	28.556 ³⁶⁴	75.82 ¹⁴⁶
36.3	10.676	15.42	58.83	33.72	28.920	77.28
Mean Place	07.937	40.08	56.187	27.55	26.146	61.99
Sec δ , Tan δ	1.001	+0.033	2.002	-1.735	1.116	-0.495
a, a'	+3.1	-17.4	+4.2	-17.4	+3.4	-17.3
b, b'	0.00	+0.5	+0.10	+0.5	+0.03	+0.5
Authority and Catalogue No.	B.J.	839.	B.J.	841	A.N.	842

APPARENT PLACES OF STARS, 1931.

447

AT UPPER TRANSIT AT GREENWICH.

Name	α Draconis		θ Centauri		94 Virginis	
Mag. Spect.	3.64	A ϕ	2.26	Ko	6.56	Ao
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ₁₄ ^m ₀₂	[°] ₊₆₄ ['] ₄₁	^h ₁₄ ^m ₀₂	[°] ₋₃₆ ['] ₀₁	^h ₁₄ ^m ₀₂	[°] ₋₈ ['] ₃₃
Jan. 1.3	^s _{30.78} 58	^s _{58.47} 207	^s _{35.532} 398	^s _{44.85} 138	^s _{37.413} 340	^s _{47.18} 198
11.3	_{31.36} 61	_{56.40} 146	_{35.930} 400	_{46.23} 167	_{37.753} 341	_{49.16} 197
21.3	_{31.97} 61	_{54.94} 81	_{36.330} 390	_{47.90} 190	_{38.094} 334	_{51.13} 191
31.2	_{32.58} 59	_{54.13} 14	_{36.720} 371	_{49.80} 207	_{38.428} 318	_{53.04} 179
Feb. 10.2	_{33.17} 56	_{53.99} 52	_{37.091} 345	_{51.87} 219	_{38.746} 295	_{54.83} 161
20.2	_{33.73} 50	_{54.51} 115	_{37.436} 313	_{54.06} 224	_{39.041} 267	_{56.44} 141
Mar. 2.1	_{34.23} 43	_{55.66} 171	_{37.749} 277	_{56.30} 225	_{39.308} 238	_{57.85} 118
12.1	_{34.66} 36	_{57.37} 218	_{38.026} 241	_{58.55} 222	_{39.546} 205	_{59.03} 94
22.1	_{35.02} 27	_{59.55} 256	_{38.267} 203	_{60.77} 214	_{39.751} 172	_{59.97} 71
Apr. 1.1	_{35.29} 18	_{62.11} 282	_{38.470} 165	_{62.91} 203	_{39.923} 141	_{60.68} 49
11.0	_{35.47} 10	_{64.93} 296	_{38.635} 129	_{64.94} 190	_{40.064} 109	_{61.17} 29
21.0	_{35.57} 1	_{67.89} 299	_{38.764} 93	_{66.84} 175	_{40.173} 81	_{61.46} 12
30.9	_{35.58} 8	_{70.88} 291	_{38.857} 59	_{68.59} 158	_{40.254} 53	_{61.58} 4
May 10.9	_{35.50} 15	_{73.79} 273	_{38.916} 25	_{70.17} 139	_{40.307} 26	_{61.54} 15
20.9	_{35.35} 21	_{76.52} 246	_{38.941} 6	_{71.56} 118	_{40.333} 1	_{61.39} 27
30.9	_{35.14} 27	_{78.98} 210	_{38.935} 37	_{72.74} 95	_{40.334} 23	_{61.12} 33
June 9.9	_{34.87} 33	_{81.08} 169	_{38.898} 66	_{73.69} 71	_{40.311} 44	_{60.79} 40
19.8	_{34.54} 37	_{82.77} 123	_{38.832} 92	_{74.40} 46	_{40.267} 65	_{60.39} 45
29.8	_{34.17} 39	_{84.00} 74	_{38.740} 117	_{74.86} 19	_{40.202} 83	_{59.94} 48
July 9.8	_{33.78} 42	_{84.74} 23	_{38.623} 136	_{75.05} 7	_{40.119} 97	_{59.46} 49
19.8	_{33.36} 42	_{84.97} 30	_{38.487} 151	_{74.98} 33	_{40.022} 109	_{58.97} 51
29.7	_{32.94} 42	_{84.67} 82	_{38.336} 159	_{74.65} 59	_{39.913} 117	_{58.46} 49
Aug. 8.7	_{32.52} 41	_{83.85} 132	_{38.177} 160	_{74.06} 82	_{39.796} 117	_{57.97} 45
18.7	_{32.11} 39	_{82.53} 180	_{38.017} 152	_{73.24} 103	_{39.679} 113	_{57.52} 42
28.7	_{31.72} 35	_{80.73} 226	_{37.865} 137	_{72.21} 119	_{39.566} 101	_{57.10} 33
Sept. 7.6	_{31.37} 25	_{78.47} 268	_{37.728} 111	_{71.02} 131	_{39.465} 82	_{56.77} 22
17.6	_{31.06} 21	_{75.79} 304	_{37.617} 76	_{69.71} 137	_{39.383} 55	_{56.55} 9
27.6	_{30.81} 18	_{72.75} 335	_{37.541} 33	_{68.34} 136	_{39.328} 22	_{56.46} 8
Oct. 7.5	_{30.63} 10	_{69.40} 361	_{37.508} 18	_{66.98} 128	_{39.306} 19	_{56.54} 28
17.5	_{30.53} 2	_{65.79} 379	_{37.526} 74	_{65.70} 113	_{39.325} 65	_{56.82} 51
27.5	_{30.51} 7	_{62.00} 387	_{37.600} 133	_{64.57} 90	_{39.390} 113	_{57.33} 74
Nov. 6.5	_{30.58} 17	_{58.13} 389	_{37.733} 193	_{63.67} 62	_{39.503} 161	_{58.07} 101
16.4	_{30.75} 26	_{54.24} 380	_{37.926} 248	_{63.05} 30	_{39.664} 208	_{59.08} 126
26.4	_{31.01} 35	_{50.44} 360	_{38.174} 299	_{62.75} 7	_{39.872} 252	_{60.34} 148
Dec. 6.4	_{31.36} 43	_{46.84} 330	_{38.473} 341	_{62.82} 45	_{40.124} 288	_{61.82} 169
16.4	_{31.79} 50	_{43.54} 290	_{38.814} 374	_{63.27} 82	_{40.412} 315	_{63.51} 184
26.3	_{32.29} 56	_{40.64} 241	_{39.188} 393	_{64.09} 117	_{40.727} 334	_{65.35} 194
36.3	_{32.85}	_{38.23}	_{39.581}	_{65.26}	_{41.061}	_{67.29}
Mean Place	31.128	78.58	36.857	52.56	38.318	46.28
Sec δ , Tan δ	2.340	+2.116	1.237	-0.727	1.011	-0.151
a, a'	+1.6	-17.2	+3.6	-17.2	+3.2	-17.2
b, b'	-0.12	+0.5	+0.04	+0.5	+0.01	+0.5
Authority and Catalogue No.	B.J.	845	B.J.	843	N.A.	844

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name		κ Virginis		α Bootis (<i>Arcturus</i>)		ζ Libræ	
Mag. Spect.		4.3I	Ko	0.24	Ko	6.30	Ko
Mean Solar Date		R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
		^h 14 ^m 09	[°] — 9 ['] 57	^h 14 ^m 12	[°] +19 ['] 31	^h 14 ^m 19	[°] —11 ['] 23
Jan.	1.3	11.700	12.65	30.039	77.25	41.555	59.68
	11.3	12.040	14.58	30.374	74.84	41.893	61.54
	21.3	12.382	16.52	30.716	72.73	42.236	63.43
	31.2	12.718	18.41	31.054	70.98	42.575	65.29
Feb.	10.2	13.040	20.20	31.379	69.64	42.900	67.06
	20.2	13.339	21.83	31.684	68.73	43.205	68.69
Mar.	2.2	13.612	23.26	31.961	68.28	43.486	70.14
	12.1	13.855	24.48	32.206	68.27	43.738	71.40
	22.1	14.066	25.48	32.418	68.66	43.959	72.44
Apr.	1.1	14.245	26.24	32.594	69.42	44.150	73.26
	11.0	14.392	26.79	32.734	70.47	44.308	73.88
	21.0	14.509	27.15	32.841	71.75	44.437	74.31
	30.9	14.597	27.34	32.915	73.19	44.536	74.56
May	10.9	14.657	27.37	32.958	74.72	44.607	74.67
	20.9	14.690	27.28	32.971	76.28	44.651	74.65
	30.9	14.697	27.08	32.957	77.79	44.667	74.53
June	9.9	14.680	26.79	32.917	79.21	44.658	74.32
	19.9	14.640	26.44	32.854	80.48	44.624	74.02
	29.8	14.579	26.03	32.770	81.57	44.568	73.67
July	9.8	14.498	25.58	32.668	82.45	44.490	73.27
	19.8	14.400	25.11	32.550	83.09	44.394	72.83
	29.7	14.291	24.62	32.421	83.47	44.285	72.37
Aug.	8.7	14.173	24.13	32.284	83.57	44.165	71.89
	18.7	14.053	23.65	32.145	83.39	44.041	71.42
	28.7	13.937	23.21	32.011	82.92	43.919	70.97
Sept.	7.6	13.831	22.83	31.887	82.16	43.806	70.57
	17.6	13.744	22.55	31.782	81.10	43.712	70.24
	27.6	13.683	22.39	31.702	79.74	43.642	70.02
Oct.	7.6	13.656	22.39	31.654	78.09	43.605	69.95
	17.5	13.669	22.58	31.647	76.17	43.608	70.05
	27.5	13.727	22.98	31.684	73.98	43.656	70.36
Nov.	6.5	13.834	23.63	31.769	71.57	43.754	70.90
	16.4	13.990	24.53	31.905	68.97	43.901	71.68
	26.4	14.194	25.68	32.090	66.24	44.097	72.72
Dec.	6.4	14.443	27.07	32.320	63.44	44.338	74.01
	16.4	14.728	28.67	32.591	60.64	44.617	75.50
	26.3	15.042	30.44	32.894	57.93	44.927	77.17
	36.3	15.376	32.31	33.220	55.39	45.258	78.97
Mean Place		12.656	11.95	30.758	87.49	42.583	59.01
Sec δ , Tan δ		1.015	—0.176	1.061	+0.355	1.020	—0.202
a, a'		+3.2	—16.9	+2.8	—16.8	+3.2	—16.4
b, b'		+0.01	+0.5	—0.02	+0.5	+0.01	+0.6
Authority and Catalogue No.		B.J.	849	B.J.	852	N.A.	860

APPARENT PLACES OF STARS, 1931.

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AT UPPER TRANSIT AT GREENWICH.

Name Mag. Spect.	f Bootis		ρ Bootis		γ Bootis	
	5·36	A5	3·78	Ko	3·00	Fo
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ₁₄ ^m ₂₃	[°] ₊₁₉ ['] ₃₁	^h ₁₄ ^m ₂₈	[°] ₊₃₀ ['] ₃₉	^h ₁₄ ^m ₂₉	[°] ₊₃₈ ['] ₃₅
Jan. 1·3	^s ₁₃ ·901	^s ₆₀ ·28	^s ₅₀ ·546	^s ₇₁ ·00	^s ₁₇ ·196	^s ₇₈ ·19
11·3	14·234	57·89	50·892	68·50	17·562	75·66
21·3	14·575	55·79	51·250	66·39	17·941	73·58
31·2	14·914	54·06	51·609	64·74	18·323	72·02
Feb. 10·2	15·243	52·73	51·958	63·58	18·697	71·02
20·2	15·553	51·84	52·290	62·96	19·052	70·60
Mar. 2·2	15·838	51·41	52·595	62·86	19·379	70·75
12·1	16·093	51·41	52·869	63·28	19·672	71·45
22·1	16·315	51·84	53·108	64·17	19·927	72·64
Apr. 1·1	16·504	52·63	53·309	65·47	20·139	74·27
11·1	16·658	53·73	53·471	67·10	20·308	76·24
21·0	16·777	55·07	53·596	68·99	20·434	78·46
30·9	16·863	56·58	53·682	71·04	20·518	80·83
May 10·9	16·919	58·20	53·733	73·18	20·560	83·27
20·9	16·944	59·85	53·750	75·31	20·563	85·67
30·9	16·941	61·46	53·734	77·36	20·530	87·97
June 9·9	16·911	62·98	53·688	79·26	20·463	90·07
19·9	16·856	64·37	53·614	80·96	20·366	91·91
29·8	16·778	65·58	53·515	82·41	20·240	93·45
July 9·8	16·681	66·57	53·394	83·56	20·091	94·65
19·8	16·566	67·33	53·254	84·38	19·923	95·47
29·8	16·438	67·83	53·100	84·86	19·741	95·88
Aug. 8·7	16·300	68·06	52·936	84·97	19·548	95·88
18·7	16·160	67·99	52·769	84·71	19·353	95·46
28·7	16·022	67·63	52·605	84·08	19·162	94·63
Sept. 7·6	15·894	66·97	52·450	83·08	18·983	93·38
17·6	15·782	66·01	52·313	81·72	18·823	91·73
27·6	15·695	64·75	52·202	80·00	18·691	89·70
Oct. 7·6	15·639	63·19	52·124	77·95	18·595	87·33
17·5	15·622	61·36	52·087	75·59	18·543	84·64
27·5	15·650	59·25	52·096	72·96	18·541	81·67
Nov. 6·5	15·726	56·92	52·157	70·11	18·593	78·50
16·5	15·851	54·39	52·272	67·09	18·704	75·17
26·4	16·027	51·72	52·440	63·96	18·873	71·78
Dec. 6·4	16·249	48·97	52·660	60·81	19·097	68·40
16·4	16·513	46·22	52·925	57·72	19·371	65·13
26·3	16·810	43·54	53·229	54·79	19·688	62·08
36·3	17·133	41·03	53·562	52·11	20·037	59·33
Mean Place	14·684	70·75	51·305	84·64	17·929	93·77
Sec δ, Tan δ	1·061	+0·355	1·163	+0·593	1·280	+0·799
a, a'	+2·8	-16·3	+2·6	-16·0	+2·4	-15·9
b, b'	-0·02	+0·6	-0·03	+0·6	-0·04	+0·6
Authority and Catalogue No.	N.A.	863	B.J.	869	B.J.	870

‡ Second transit, Apr. 30.

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name	η Centauri		α^2 Centauri		α Circini	
Mag. Spect.	2.65	B ₃ p—A ₂ p	0.33	Go—K ₅	3.42	Fo
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 14 ^m 31	[°] —41 ['] 51	^h 14 ^m 34	[°] —60 ['] 32	^h 14 ^m 36	[°] —64 ['] 40
Jan. 1.3	05.350 ^s	12.88 ["]	51.64 ^s	53.53 ["]	51.52 ^s	22.08 ["]
11.3	05.770 ⁴²⁰	13.79 ⁹¹	52.21 ⁵⁷	53.88 ³⁵	52.17 ⁶⁵	22.18 ¹⁰
21.3	06.197 ⁴²⁷	15.04 ¹²⁵	52.80 ⁵⁹	54.70 ⁸²	52.85 ⁶⁸	22.78 ⁶⁰
31.2	06.621 ⁴²⁴	16.57 ¹⁵³	53.39 ⁵⁹	55.97 ¹²⁷	53.52 ⁶⁷	23.85 ¹⁰⁷
Feb. 10.2	07.032 ⁴¹¹	18.35 ¹⁷⁸	53.96 ⁵⁷	57.64 ¹⁶⁷	54.17 ⁶⁵	25.37 ¹⁵²
	389	196	53	203	63	192
20.2	07.421 ³⁶⁰	20.31 ²¹⁰	54.49 ⁴⁹	59.67 ²³³	54.80 ⁵⁹	27.29 ²²⁵
Mar. 2.2	07.781 ³²⁸	22.41 ²¹⁸	54.98 ⁴⁵	62.00 ²⁵⁵	55.39 ⁵³	29.54 ²⁵³
12.1	08.109 ²⁹¹	24.59 ²²²	55.43 ⁴⁰	64.55 ²⁷³	55.92 ⁴⁸	32.07 ²⁷⁵
22.1	08.400 ²⁵⁴	26.81 ²²¹	55.83 ³³	67.28 ²⁸⁴	56.40 ⁴¹	34.82 ²⁹¹
Apr. 1.1	08.654 ²¹⁶	29.02 ²¹⁷	56.16 ²⁸	70.12 ²⁸⁹	56.81 ³⁵	37.73 ³⁰¹
11.1	08.870 ¹⁷⁷	31.19 ²¹⁰	56.44 ²²	73.01 ²⁸⁹	57.16 ²⁸	40.74 ³⁰⁴
21.0	09.047 ¹³⁹	33.29 ¹⁹⁹	56.66 ¹⁶	75.90 ²⁸³	57.44 ²¹	43.78 ³⁰²
May 1.0	09.186 ¹⁰⁰	35.28 ¹⁸⁶	56.82 ¹⁰	78.73 ²⁷³	57.65 ¹⁴	46.80 ²⁹⁵
10.9	09.286 ⁶¹	37.14 ¹⁷⁰	56.92 ³	81.46 ²⁵⁷	57.79 ⁷	49.75 ²⁸¹
20.9	09.347 ²³	38.84 ¹⁵²	56.95 ³	84.03 ²³⁶	57.86 ¹	52.56 ²⁶²
30.9	09.370 ¹⁴	40.36 ¹³¹	56.92 ⁹	86.39 ²⁰⁹	57.85 ⁸	55.18 ²³⁶
June 9.9	09.356 ⁵⁰	41.67 ¹⁰⁷	56.83 ¹⁴	88.48 ¹⁸⁰	57.77 ¹⁴	57.54 ²⁰⁷
19.9	09.306 ⁸⁴	42.74 ⁸²	56.69 ¹⁹	90.28 ¹⁴⁵	57.63 ²¹	59.61 ¹⁷²
29.8	09.222 ¹¹⁶	43.56 ⁵⁴	56.50 ²⁴	91.73 ¹⁰⁸	57.42 ²⁷	61.33 ¹³³
July 9.8	09.106 ¹⁴²	44.10 ²⁵	56.26 ²⁸	92.81 ⁶⁶	57.15 ³¹	62.66 ⁹⁰
19.8	08.964 ¹⁶⁴	44.35 ⁵	55.98 ³¹	93.47 ²⁴	56.84 ³⁵	63.56 ⁴⁵
29.8	08.800 ¹⁸⁰	44.30 ³⁵	55.67 ³³	93.71 ²⁰	56.49 ³⁷	64.01 ²
Aug. 8.7	08.620 ¹⁸⁶	43.95 ⁶⁴	55.34 ³³	93.51 ⁶³	56.12 ³⁹	63.99 ⁴⁸
18.7	08.434 ¹⁸⁴	43.31 ⁹¹	55.01 ³³	92.88 ¹⁰⁶	55.73 ³⁷	63.51 ⁹⁴
28.7	08.250 ¹⁷²	42.40 ¹¹⁴	54.68 ³⁰	91.82 ¹⁴⁵	55.36 ³⁵	62.57 ¹³⁶
Sept. 7.6	08.078 ¹⁴⁹	41.26 ¹³⁴	54.38 ²⁶	90.37 ¹⁷⁷	55.01 ³¹	61.21 ¹⁷⁴
17.6	07.929 ¹¹⁴	39.92 ¹⁴⁷	54.12 ²¹	88.60 ²⁰⁴	54.70 ²⁵	59.47 ²⁰⁵
27.6	07.815 ⁷⁰	38.45 ¹⁵⁵	53.91 ¹⁴	86.56 ²²²	54.45 ¹⁸	57.42 ²²⁸
Oct. 7.6	07.745 ¹⁸	36.90 ¹⁵⁴	53.77 ⁶	84.34 ²³³	54.27 ⁸	55.14 ²⁴³
17.5	07.727 ⁴²	35.36 ¹⁴⁶	53.71 ³	82.01 ²³²	54.19 ²	52.71 ²⁴⁷
27.5	07.769 ¹⁰⁶	33.90 ¹³²	53.74 ¹³	79.69 ²²³	54.21 ¹³	50.24 ²⁴⁰
Nov. 6.5	07.875 ¹⁷²	32.58 ¹⁰⁸	53.87 ²²	77.46 ²⁰²	54.34 ²³	47.84 ²²⁴
16.5	08.047 ²³⁴	31.50 ⁷⁹	54.09 ³¹	75.44 ¹⁷⁴	54.57 ³⁴	45.60 ¹⁹⁷
26.4	08.281 ²⁹²	30.71 ⁴⁶	54.40 ³⁹	73.70 ¹³⁶	54.91 ⁴³	43.63 ¹⁶²
Dec. 6.4	08.573 ³⁴²	30.25 ⁹	54.79 ⁴⁷	72.34 ⁹⁵	55.34 ⁵²	42.01 ¹²⁰
16.4	08.915 ³⁸²	30.16 ²⁹	55.26 ⁵²	71.39 ⁴⁶	55.86 ⁵⁸	40.81 ⁷³
26.3	09.297 ⁴¹⁰	30.45 ⁶⁸	55.78 ⁵⁷	70.93 ²	56.44 ⁶⁴	40.08 ²³
36.3	09.707	31.13	56.35	70.95	57.08	39.85
Mean Place	07.002	20.49	53.809	65.49	54.503	33.92
Sec δ , Tan δ	1.343	—0.896	2.034	—1.771	2.338	—2.113
a, a'	+3.8	—15.8	+4.6	—15.6	+4.9	—15.5
b, b'	+0.05	+0.6	+0.09	+0.6	+0.11	+0.6
Authority and Catalogue No.	B.J.	873	A.E.	875	A.N.	877

No. 875. Corrected for a parallax of 0".76. The reductions from $c.g.$ to brighter star (α^2) vary during the year from +0".334, +0".49 to +0".305, +0".10. The mean place is that of $c.g.$

‡ Second transit, Apr. 30.

† First transit, May 1.

APPARENT PLACES OF STARS, 1931.

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AT UPPER TRANSIT AT GREENWICH.

Name Mag. Spect.	α Lupi		α Apodis		ε Bootis	
	2.89	B2	3.81	K5	2.70	Ko
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 14 ^m 37	[°] -47 ['] 05	^h 14 ^m 39	[°] -78 ['] 45	^h 14 ^m 41	[°] +27 ['] 21
Jan. 1.3	17.905 ^s 448	26.42 67	05.72 ^s 131	00.94 36	57.480 ^s 333	38.56 253
11.3	18.353 ^s 458	27.09 104	07.03 ^s 134	00.58 21	57.813 ^s 347	36.03 219
21.3	18.811 ^s 456	28.13 138	08.37 ^s 136	00.79 76	58.160 ^s 350	33.84 177
31.3	19.267 ^s 444	29.51 167	09.73 ^s 135	01.55 129	58.510 ^s 343	32.07 129
Feb. 10.2	19.711 ^s 423	31.18 192	11.08 ^s 128	02.84 177	58.853 ^s 327	30.78 79
20.2	20.134 ^s 394	33.10 210	12.36 ^s 121	04.61 221	59.180 ^s 306	29.99 27
Mar. 2.2	20.528 ^s 360	35.20 224	13.57 ^s 111	06.82 258	59.486 ^s 277	29.72 23
12.1	20.888 ^s 322	37.44 233	14.68 ^s 98	09.40 290	59.763 ^s 245	29.95 70
22.1	21.210 ^s 283	39.77 237	15.66 ^s 85	12.30 313	60.008 ^s 210	30.65 111
Apr. 1.1	21.493 ^s 241	42.14 236	16.51 ^s 70	15.43 331	60.218 ^s 175	31.76 146
11.1	21.734 ^s 198	44.50 232	17.21 ^s 55	18.74 342	60.393 ^s 138	33.22 173
21.0	21.932 ^s 156	46.82 225	17.76 ^s 39	22.16 345	60.531 ^s 102	34.95 192
May 1.0	22.088 ^s 113	49.07 213	18.15 ^s 22	25.61 341	60.633 ^s 68	36.87 202
10.9	22.201 ^s 71	51.20 198	18.37 ^s 5	29.02 330	60.701 ^s 34	38.89 205
20.9	22.272 ^s 27	53.18 179	18.42 ^s 12	32.32 313	60.735 ^s 1	40.94 200
30.9	22.299 ^s 14	54.97 158	18.30 ^s 28	35.45 288	60.736 ^s 29	42.94 188
June 9.9	22.285 ^s 56	56.55 134	18.02 ^s 43	38.33 257	60.707 ^s 57	44.82 170
19.9	22.229 ^s 94	57.89 105	17.59 ^s 56	40.90 218	60.650 ^s 84	46.52 149
29.8	22.135 ^s 130	58.94 75	17.03 ^s 70	43.08 176	60.566 ^s 108	48.01 121
July 9.8	22.005 ^s 161	59.69 43	16.33 ^s 80	44.84 128	60.458 ^s 129	49.22 92
19.8	21.844 ^s 185	60.12 10	15.53 ^s 88	46.12 77	60.329 ^s 144	50.14 60
29.8	21.659 ^s 203	60.22 25	14.65 ^s 93	46.89 23	60.185 ^s 157	50.74 25
Aug. 8.7	21.456 ^s 212	59.97 58	13.72 ^s 94	47.12 31	60.028 ^s 162	50.99 9
18.7	21.244 ^s 209	59.39 89	12.78 ^s 92	46.81 85	59.866 ^s 163	50.90 45
28.7	21.035 ^s 197	58.50 118	11.86 ^s 86	45.96 137	59.703 ^s 155	50.45 80
Sept. 7.7	20.838 ^s 173	57.32 142	11.00 ^s 75	44.59 183	59.548 ^s 140	49.65 117
17.6	20.665 ^s 136	55.90 161	10.25 ^s 63	42.76 224	59.408 ^s 116	48.48 151
27.6	20.529 ^s 88	54.29 173	09.62 ^s 46	40.52 255	59.292 ^s 86	46.97 184
Oct. 7.6	20.441 ^s 31	52.56 177	09.16 ^s 26	37.97 278	59.206 ^s 46	45.13 215
17.5	20.410 ^s 33	50.79 172	08.90 ^s 6	35.19 289	59.160 ^s 1	42.98 243
27.5	20.443 ^s 102	49.07 160	08.84 ^s 17	32.30 288	59.159 ^s 48	40.55 267
Nov. 6.5	20.545 ^s 173	47.47 140	09.01 ^s 41	29.42 276	59.207 ^s 101	37.88 287
16.5	20.718 ^s 242	46.07 111	09.42 ^s 62	26.66 253	59.308 ^s 154	35.01 300
26.4	20.960 ^s 306	44.96 78	10.04 ^s 82	24.13 218	59.462 ^s 205	32.01 305
Dec. 6.4	21.266 ^s 361	44.18 41	10.86 ^s 100	21.95 176	59.667 ^s 249	28.96 302
16.4	21.627 ^s 404	43.77 —	11.86 ^s 115	20.19 127	59.916 ^s 290	25.94 290
26.4	22.031 ^s 437	43.77 40	13.01 ^s 126	18.92 73	60.206 ^s 319	23.04 270
36.3	22.468 ^s	44.17	14.27 ^s	18.19	60.525 ^s	20.34
Mean Place	19.773	34.86	12.132	14.32	58.337	51.50
Sec δ, Tan δ	1.469	-1.076	5.128	-5.029	1.126	+0.518
a, a'	+4.0	-15.5	+7.4	-15.4	+2.6	-15.2
b, b'	+0.06	+0.6	+0.26	+0.6	-0.03	+0.6
Authority and Catalogue No.	A.N.	878	B.J.	881	N.A.	885

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name Mag. Spect.	α Libræ		β Ursæ Minoris		ξ^2 Libræ	
	2.90	A3	2.24	K5	5.63	Ko
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ^m 14 47	[°] ['] -15 45	^h ^m 14 50	[°] ['] +74 25	^h ^m 14 53	[°] ['] -11 07
Jan. 1.3	02.182 ^s	22.16 ["]	51.76 ^s	54.31 ["]	00.006 ^s	58.10 ["]
11.3	02.517 335	23.77 161	52.52 76	51.85 246	00.332 326	59.82 172
21.3	02.862 345	25.46 169	53.35 83	49.97 188	00.670 338	61.57 175
31.3	03.207 345	27.17 171	54.23 88	48.73 124	01.008 338	63.29 172
Feb. 10.2	03.544 337	28.84 167	55.12 89	48.16 57	01.340 332	64.93 164
	321	159	87	12	317	150
20.2	03.865 300	30.43 147	55.99 82	48.28 79	01.657 298	66.43 133
Mar. 2.2	04.165 275	31.90 131	56.81 75	49.07 140	01.955 273	67.76 113
12.1	04.440 247	33.21 114	57.56 64	50.47 195	02.228 248	68.89 93
22.1	04.687 218	34.35 95	58.20 53	52.42 241	02.476 220	69.82 71
Apr. 1.1	04.905 189	35.30 77	58.73 40	54.83 276	02.696 190	70.53 51
11.1	05.094 159	36.07 61	59.13 26	57.59 299	02.886 161	71.04 32
21.0	05.253 130	36.68 45	59.39 11	60.58 312	03.047 133	71.36 16
May 1.0	05.383 101	37.13 32	59.50 2	63.70 311	03.180 104	71.52 3
10.9	05.484 71	37.45 19	59.48 16	66.81 301	03.284 75	71.55 10
20.9	05.555 43	37.64 8	59.32 29	69.82 281	03.359 46	71.45 19
30.9	05.598 14	37.72 1	59.03 40	72.63 251	03.405 18	71.26 25
June 9.9	05.612 15	37.71 10	58.63 51	75.14 214	03.423 9	71.01 32
19.9	05.597 61	37.61 17	58.12 59	77.28 172	03.414 38	70.69 36
29.8	05.556 67	37.44 24	57.53 67	79.00 124	03.376 63	70.33 39
July 9.8	05.489 89	37.20 31	56.86 72	80.24 74	03.313 85	69.94 40
19.8	05.400 109	36.89 37	56.14 76	80.98 21	03.228 105	69.54 42
29.8	05.291 123	36.52 41	55.38 78	81.19 32	03.123 121	69.12 43
Aug. 8.7	05.168 133	36.11 45	54.60 78	80.87 85	03.002 130	68.69 42
18.7	05.035 135	35.66 47	53.82 76	80.02 136	02.872 134	68.27 39
28.7	04.900 129	35.19 47	53.06 73	78.66 186	02.738 128	67.88 34
Sept. 7.7	04.771 116	34.72 45	52.33 68	76.80 232	02.610 117	67.54 27
17.6	04.655 93	34.27 39	51.65 60	74.48 274	02.493 95	67.27 18
27.6	04.562 61	33.88 29	51.05 51	71.74 311	02.398 66	67.09 6
Oct. 7.6	04.501 23	33.59 15	50.54 40	68.63 342	02.332 27	67.03 10
17.5	04.478 22	33.44 2	50.14 28	65.21 366	02.305 16	67.13 28
27.5	04.500 72	33.46 21	49.86 14	61.55 383	02.321 63	67.41 49
Nov. 6.5	04.572 124	33.67 44	49.72 16	57.72 391	02.384 114	67.90 71
16.5	04.696 175	34.11 69	49.72 16	53.81 390	02.498 165	68.61 94
26.4	04.871 223	34.80 93	49.88 30	49.91 377	02.663 213	69.55 117
Dec. 6.4	05.094 265	35.73 116	50.18 45	46.14 354	02.876 254	70.72 137
16.4	05.359 300	36.89 135	50.63 59	42.60 320	03.130 289	72.09 153
26.4	05.659 325	38.24 153	51.22 69	39.40 277	03.419 317	73.62 167
36.3	05.984	39.77	51.91	36.63	03.736	75.29
Mean Place	03.402	21.64	53.130	75.04	01.198	55.95
Sec δ , Tan δ	1.039	-0.282	3.727	+3.591	1.019	-0.197
a, a'	+3.3	-14.9	-0.2	-14.7	+3.3	-14.6
b, b'	+0.01	+0.7	-0.18	+0.7	+0.01	+0.7
Authority and Catalogue No.	B. J.	891	B. J.	896	N. A.	899

APPARENT PLACES OF STARS, 1931.

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AT UPPER TRANSIT AT GREENWICH.

Name	β Lupi		κ Centauri		β Bootis	
	2.81	B2p	3.35	B3	3.63	G5
Mag. Spect.						
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 14 ^m 53	[°] -42 ['] 51	^h 14 ^m 54	[°] -41 ['] 49	^h 14 ^m 59	[°] +40 ['] 39
Jan. 1.3	58.342 ^s 416	19.14 ["] 64	38.011 ^s 410	36.14 ["] 65	19.774 ^s 351	26.98 ["] 273
11.3	58.758 430	19.78 97	38.421 423	36.79 98	20.125 372	24.25 230
21.3	59.188 432	20.75 126	38.844 426	37.77 127	20.497 383	21.95 180
31.3	59.620 424	22.01 152	39.270 418	39.04 152	20.880 382	20.15 123
Feb. 10.2	60.044 406	23.53 172	39.688 402	40.56 171	21.262 370	18.92 64
20.2	60.450 383	25.25 188	40.090 378	42.27 185	21.632 349	18.28 3
Mar. 2.2	60.833 353	27.13 199	40.468 349	44.12 196	21.981 320	18.25 55
12.2	61.186 321	29.12 206	40.817 317	46.08 202	22.301 286	18.80 109
22.1	61.507 285	31.18 209	41.134 283	48.10 204	22.587 246	19.89 156
Apr. 1.1	61.792 249	33.27 206	41.417 246	50.14 203	22.833 205	21.45 196
11.1	62.041 210	35.33 203	41.663 209	52.17 198	23.038 162	23.41 226
21.0	62.251 172	37.36 197	41.872 171	54.15 191	23.200 118	25.67 247
May 1.0	62.423 ⁶ 133	39.33 187	42.043 ⁶ 132	56.06 181	23.318 75	28.14 257
10.9	62.556 92	41.20 175	42.175 94	57.87 169	23.393 33	30.71 258
20.9	62.648 53	42.95 159	42.269 53	59.56 154	23.426 7	33.29 251
30.9	62.701 12	44.54 141	42.322 14	61.10 136	23.419 86	35.80 234
June 9.9	62.713 28	45.95 121	42.336 25	62.46 116	23.373 42	38.14 212
19.9	62.685 28	47.16 121	42.311 25	63.62 116	23.291 116	40.26 182
29.9	62.620 65	48.13 97	42.248 63	64.56 68	23.175 145	42.08 149
July 9.8	62.518 102	48.85 72	42.149 99	65.24 41	23.030 170	43.57 111
19.8	62.385 161	49.29 15	42.019 156	65.65 13	22.860 192	44.68 70
29.8	62.224 181	49.44 14	41.863 176	65.78 16	22.668 207	45.38 27
Aug. 8.7	62.043 193	49.30 44	41.687 189	65.62 44	22.461 215	45.65 16
18.7	61.850 196	48.86 73	41.498 191	65.18 71	22.246 217	45.49 60
28.7	61.654 188	48.13 98	41.307 184	64.47 96	22.029 210	44.89 104
Sept. 7.7	61.466 169	47.15 120	41.123 166	63.51 117	21.819 195	43.85 146
17.6	61.297 139	45.95 138	40.957 135	62.34 135	21.624 171	42.39 187
27.6	61.158 97	44.57 150	40.822 95	60.99 144	21.453 137	40.52 225
Oct. 7.6	61.061 45	43.07 153	40.727 45	59.55 148	21.316 95	38.27 260
17.6	61.016 13	41.54 151	40.682 13	58.07 145	21.221 46	35.67 291
27.5	61.029 78	40.03 139	40.695 76	56.62 134	21.175 9	32.76 316
Nov. 6.5	61.107 144	38.64 121	40.771 142	55.28 116	21.184 68	29.60 335
16.5	61.251 210	37.43 97	40.913 207	54.12 91	21.252 129	26.25 346
26.4	61.461 271	36.46 67	41.120 267	53.21 62	21.381 187	22.79 348
Dec. 6.4	61.732 326	35.79 33	41.387 321	52.59 28	21.568 243	19.31 340
16.4	62.058 370	35.46 3	41.708 365	52.31 7	21.811 292	15.91 322
26.4	62.428 403	35.49 39	42.073 398	52.38 43	22.103 330	12.69 294
36.3	62.831	35.88	42.471	52.81	22.433	09.75
Mean Place	60.159	25.53	39.799	42.21	20.727	43.09
Sec δ , Tan δ	1.364	-0.928	1.342	-0.895	1.318	+0.859
a, a'	+3.9	-14.5	+3.9	-14.5	+2.3	-14.2
b, b'	+0.04	+0.7	+0.04	+0.7	-0.04	+0.7
Authority and Catalogue No.	B.J.	901	A.N.	902	B.J.	906

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name	γ Scorpii		ψ Bootis		ζ Lupi	
	3.41	Mb	4.67	Ko	3.50	Ko
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 15 ^m 00	[°] —25 ['] 00	^h 15 ^m 01	[°] +27 ['] 12	^h 15 ^m 07	[°] —51 ['] 50
Jan. 1.3	00.115 ^s 348	41.25 123	28.246 ^s 322	43.78 262	16.651 ^s 469	09.18 15
11.3	00.463 361	42.48 138	28.568 339	41.16 228	17.120 490	09.33 54
21.3	00.824 363	43.86 151	28.907 346	38.88 187	17.610 497	09.87 92
31.3	01.187 356	45.37 158	29.253 343	37.01 141	18.107 492	10.79 125
Feb. 10.2	01.543 343	46.95 160	29.596 332	35.60 91	18.599 477	12.04 155
20.2	01.886 323	48.55 157	29.928 312	34.69 39	19.076 453	13.59 181
Mar. 2.2	02.209 299	50.12 151	30.240 288	34.30 13	19.529 422	15.40 201
12.2	02.508 272	51.63 143	30.528 259	34.43 61	19.951 387	17.41 216
22.1	02.780 243	53.06 132	30.787 226	35.04 105	20.338 347	19.57 227
Apr. 1.1	03.023 213	54.38 120	31.013 192	36.09 142	20.685 306	21.84 233
11.1	03.236 183	55.58 108	31.205 157	37.51 172	20.991 261	24.17 236
21.0	03.419 153	56.66 95	31.362 122	39.23 193	21.252 216	26.53 235
May 1.0	03.572 121	57.61 84	31.484 88	41.16 206	21.468 168	28.88 229
10.9	03.693 90	58.45 71	31.572 53	43.22 211	21.636 [†] 119	31.17 220
20.9	03.783 58	59.16 60	31.625 20	45.33 208	21.755 70	33.37 206
30.9	03.841 26	59.76 48	31.645 13	47.41 198	21.825 19	35.43 189
June 9.9	03.867 5	60.24 35	31.632 43	49.39 183	21.844 30	37.32 167
19.9	03.862 37	60.59 22	31.589 73	51.22 161	21.814 79	38.99 141
29.9	03.825 65	60.81 10	31.516 99	52.83 135	21.735 124	40.40 113
July 9.8	03.760 92	60.91 4	31.417 123	54.18 106	21.611 164	41.53 82
19.8	03.668 115	60.87 17	31.294 143	55.24 75	21.447 199	42.35 47
29.8	03.553 133	60.70 31	31.151 158	55.99 41	21.248 226	42.82 10
Aug. 8.7	03.420 145	60.39 43	30.993 167	56.40 5	21.022 243	42.92 26
18.7	03.275 149	59.96 54	30.826 171	56.45 30	20.779 248	42.66 62
28.7	03.126 145	59.42 64	30.655 167	56.15 67	20.531 242	42.04 97
Sept. 7.7	02.981 132	58.78 70	30.488 154	55.48 103	20.289 221	41.07 127
17.6	02.849 110	58.08 73	30.334 133	54.45 139	20.068 187	39.80 154
27.6	02.739 77	57.35 71	30.201 106	53.06 172	19.881 140	38.26 174
Oct. 7.6	02.662 36	56.64 64	30.095 68	51.34 205	19.741 81	36.52 186
17.6	02.626 10	56.00 53	30.027 23	49.29 235	19.660 13	34.66 191
27.5	02.636 63	55.47 37	30.004 26	46.94 260	19.647 61	32.75 186
Nov. 6.5	02.699 118	55.10 17	30.030 78	44.34 282	19.708 140	30.89 174
16.5	02.817 173	54.93 7	30.108 132	41.52 297	19.848 217	29.15 152
26.4	02.990 225	55.00 32	30.240 183	38.55 305	20.065 290	27.63 124
Dec. 6.4	03.215 270	55.32 59	30.423 231	35.50 304	20.355 355	26.39 90
16.4	03.485 308	55.91 85	30.654 273	32.46 295	20.710 410	25.49 52
26.4	03.793 336	56.76 107	30.927 305	29.51 276	21.120 453	24.97 12
36.3	04.129	57.83	31.232	26.75	21.573	24.85
Mean Place	01.536	42.73	29.224	56.86	18.912	16.54
Sec δ , Tan δ	1.104	—0.467	1.124	+0.514	1.618	—1.272
a, a'	+3.5	—14.2	+2.6	—14.1	+4.3	—13.7
b, b'	+0.02	+0.7	—0.02	+0.7	+0.06	+0.7
Authority and Catalogue No.	B. J.	907	B. J.	910	B. J.	914

† Second transit, May 10.

APPARENT PLACES OF STARS, 1931.

455

AT UPPER TRANSIT AT GREENWICH.

Name Mag. Spect.	♌ Libræ		♋ Trianguli Australis		♈ Bootis	
	4.66	Aop	3.06	Ao	3.54	Ko
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ₁₅ ^m ₀₈	[°] _{—19} ['] ₃₁	^h ₁₅ ^m ₁₂	[°] _{—68} ['] ₂₅	^h ₁₅ ^m ₁₂	[°] ₊₃₃ ['] ₃₃
Jan. 1.4	^s _{15.590}	["] ₃₃₂ 54.60	^s _{22.58}	["] ₇₂ 25.22	^s _{42.084}	["] ₃₂₄ 62.17
11.3	_{15.922} 346	₁₄₇ 55.96	_{23.30} 75	₂ 24.70	₃₄₆ 42.408	₂₇₅ 59.42
21.3	_{16.268} 350	₁₅₃ 57.43	_{24.05} 78	₂ 24.68	₃₅₇ 42.754	₁₉₃ 57.04
31.3	_{16.618} 346	₁₅₄ 58.96	_{24.83} 77	₄₇ 25.15	₃₅₇ 43.111	₁₄₂ 55.11
Feb. 10.2	_{16.964} 333	₁₅₁ 60.50	_{25.60} 75	₁₃₇ 26.08	₃₄₉ 43.468	₈₇ 53.69
20.2	_{17.297} 315	₁₄₂ 62.01	_{26.35} 73	₁₇₆ 27.45	₃₃₂ 43.817	₃₁ 52.82
Mar. 2.2	_{17.612} 294	₁₃₂ 63.43	_{27.08} 68	₂₁₀ 29.21	₃₀₇ 44.149	₂₅ 52.51
12.2	_{17.906} 268	₁₁₈ 64.75	_{27.76} 62	₂₃₉ 31.31	₂₇₈ 44.456	₇₈ 52.76
22.1	_{18.174} 242	₁₀₃ 65.93	_{28.38} 56	₂₆₃ 33.70	₂₄₅ 44.734	₁₂₅ 53.54
Apr. 1.1	_{18.416} 214	₈₉ 66.96	_{28.94} 49	₂₇₉ 36.33	₂₀₈ 44.979	₁₆₅ 54.79
11.1	_{18.630} 185	₇₅ 67.85	_{29.43} 41	₂₉₂ 39.12	₁₇₂ 45.187	₁₉₇ 56.44
21.1	_{18.815} 155	₆₁ 68.60	_{29.84} 33	₂₉₈ 42.04	₁₃₄ 45.359	₂₂₀ 58.41
May 1.0	_{18.970} 126	₄₉ 69.21	_{30.17} 25	₂₉₈ 45.02	₉₆ 45.493	₂₃₄ 60.61
11.0	_{19.096} 95	₃₈ 69.70	_{30.42} 16	₂₉₃ 48.00	₅₈ 45.589	₂₃₉ 62.95
20.9	_{19.191} 64	₂₇ 70.08	_{30.58} 7	₂₈₁ 50.93	₂₁ 45.647	₂₃₅ 65.34
30.9	_{19.255} 34	₁₇ 70.35	_{30.65} 1	₂₆₄ 53.74	₁₅ 45.668	₂₂₄ 67.69
June 9.9	_{19.289} 3	₉ 70.52	_{30.64} 10	₂₄₀ 56.38	₄₉ 45.653	₂₀₇ 69.93
19.9	_{19.292} 28	_— 70.61	_{30.54} 19	₂₁₀ 58.78	₈₁ 45.604	₁₈₂ 72.00
29.9	_{19.264} 56	₈ 70.61	_{30.35} 27	₁₇₆ 60.88	₁₁₁ 45.523	₁₅₃ 73.82
July 9.8	_{19.208} 83	₁₇ 70.53	_{30.08} 33	₁₃₆ 62.64	₁₃₈ 45.412	₁₂₀ 75.35
19.8	_{19.125} 107	₂₅ 70.36	_{29.75} 39	₉₂ 64.00	₁₆₀ 45.274	₈₄ 76.55
29.8	_{19.018} 125	₃₃ 70.11	_{29.36} 43	₄₅ 64.92	₁₇₈ 45.114	₄₆ 77.39
Aug. 8.8	_{18.893} 138	₄₀ 69.78	_{28.93} 46	₃ 65.37	₁₈₉ 44.936	₇ 77.85
18.7	_{18.755} 143	₄₆ 69.38	_{28.47} 47	₅₁ 65.34	₁₉₃ 44.747	₃₄ 77.92
28.7	_{18.612} 141	₄₉ 68.92	_{28.00} 45	₉₈ 64.83	₁₉₀ 44.554	₇₄ 77.58
Sept. 7.7	_{18.471} 130	₅₁ 68.43	_{27.55} 41	₁₄₃ 63.85	₁₇₉ 44.364	₁₁₄ 76.84
17.6	_{18.341} 110	₄₉ 67.92	_{27.14} 36	₁₈₂ 62.42	₁₅₈ 44.185	₁₅₃ 75.70
27.6	_{18.231} 80	₄₅ 67.43	_{26.78} 29	₂₁₅ 60.60	₁₃₁ 44.027	₁₉₁ 74.17
Oct. 7.6	_{18.151} 42	₃₅ 66.98	_{26.49} 18	₂₃₈ 58.45	₉₁ 43.896	₂₂₅ 72.26
17.6	_{18.109} 2	₂₁ 66.63	_{26.31} 7	₂₅₃ 56.07	₄₇ 43.805	₂₅₇ 70.01
27.5	_{18.111} 52	₅ 66.42	_{26.24} 4	₂₅₇ 53.54	₄ 43.758	₂₈₄ 67.44
Nov. 6.5	_{18.163} 106	₁₅ 66.37	_{26.28} 17	₂₅₀ 50.97	₅₉ 43.762	₃₀₆ 64.60
16.5	_{18.269} 158	₃₈ 66.52	_{26.45} 30	₂₃₃ 48.47	₁₁₅ 43.821	₃₂₁ 61.54
26.5	_{18.427} 208	₆₂ 66.90	_{26.75} 41	₂₀₆ 46.14	₁₇₁ 43.936	₃₂₇ 58.33
Dec. 6.4	_{18.635} 254	₈₄ 67.52	_{27.16} 52	₁₇₂ 44.08	₂₂₂ 44.107	₃₂₅ 55.06
16.4	_{18.889} 292	₁₀₆ 68.36	_{27.68} 62	₁₃₀ 42.36	₂₆₈ 44.329	₃₁₄ 51.81
26.4	_{19.181} 324	₁₂₅ 69.42	_{28.30} 69	₈₄ 41.06	₃₀₆ 44.597	₂₉₁ 48.67
36.3	_{19.505}	_— 70.67	_{28.99}	_— 40.22	_— 44.903	_— 45.76
Mean Place	16.962	54.15	26.394	34.84	43.124	76.76
Sec δ, Tan δ	1.061	—0.355	2.720	—2.529	1.200	+0.664
a, a'	+3.4	—13.7	+5.6	—13.4	+2.4	—13.4
b, b'	+0.02	+0.7	+0.11	+0.7	—0.03	+0.7
Authority and Catalogue No.	A.N.	915	B.J.	918	B.J.	919

‡ Second transit, May 10.

‡ First transit, May 11.

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name	β Libræ		δ Lupi		α^2 Libræ	
	2.74	B8	3.43	B2	6.74	K2
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ^m 15 13	[°] ['] —9 07	^h ^m 15 16	[°] ['] —40 23	^h ^m 15 19	[°] ['] —14 53
Jan. 1.4	16.136 ^s	49.35	48.258 ^s	51.76	09.258 ^s	22.14
11.3	16.451 ^s	51.06	48.650 ^s	52.24	09.578 ^s	23.61
21.3	16.781 ^s	52.77	49.060 ^s	53.02	09.913 ^s	25.14
31.3	17.115 ^s	54.44	49.478 ^s	54.07	10.253 ^s	26.68
Feb. 10.2	17.445 ^s	56.00	49.892 ^s	55.35	10.591 ^s	28.18
20.2	17.765 ^s	57.41	50.295 ^s	56.82	10.920 ^s	29.60
Mar. 2.2	18.069 ^s	58.63	50.680 ^s	58.43	11.232 ^s	30.89
12.2	18.352 ^s	59.63	51.040 ^s	60.14	11.525 ^s	32.03
22.1	18.611 ^s	60.41	51.372 ^s	61.92	11.795 ^s	32.99
Apr. 1.1	18.844 ^s	60.97	51.673 ^s	63.73	12.039 ^s	33.77
11.1	19.050 ^s	61.32	51.941 ^s	65.54	12.257 ^s	34.38
21.1	19.229 ^s	61.46	52.175 ^s	67.33	12.447 ^s	34.83
May 1.0	19.380 ^s	61.44	52.372 ^s	69.06	12.609 ^s	35.13
11.0	19.502 ^s	61.29	52.532 ^s	70.73	12.742 ^s	35.31
20.9	19.596 ^s	61.03	52.654 ^s	72.30	12.845 ^s	35.37
30.9	19.660 ^s	60.69	52.736 ^s	73.76	12.918 ^s	35.36
June 9.9	19.695 ^s	60.30	52.777 ^s	75.07	12.960 ^s	35.26
19.9	19.700 ^s	59.87	52.778 ^s	76.22	12.971 ^s	35.11
29.9	19.674 ^s	59.42	52.740 ^s	77.19	12.952 ^s	34.91
July 9.8	19.622 ^s	58.97	52.663 ^s	77.93	12.903 ^s	34.66
19.8	19.545 ^s	58.52	52.552 ^s	78.44	12.828 ^s	34.37
29.8	19.445 ^s	58.09	52.410 ^s	78.70	12.727 ^s	34.05
Aug. 8.8	19.326 ^s	57.68	52.243 ^s	78.70	12.608 ^s	33.70
18.7	19.195 ^s	57.30	52.061 ^s	78.43	12.473 ^s	33.33
28.7	19.057 ^s	56.97	51.870 ^s	77.90	12.332 ^s	32.95
Sept. 7.7	18.920 ^s	56.70	51.681 ^s	77.13	12.191 ^s	32.58
17.6	18.793 ^s	56.51	51.506 ^s	76.15	12.058 ^s	32.22
27.6	18.684 ^s	56.42	51.357 ^s	74.98	11.945 ^s	31.93
Oct. 7.6	18.602 ^s	56.46	51.244 ^s	73.70	11.858 ^s	31.71
17.6	18.555 ^s	56.66	51.176 ^s	72.35	11.806 ^s	31.60
27.5	18.550 ^s	57.03	51.163 ^s	71.00	11.798 ^s	31.64
Nov. 6.5	18.593 ^s	57.60	51.212 ^s	69.73	11.838 ^s	31.86
16.5	18.686 ^s	58.39	51.325 ^s	68.60	11.929 ^s	32.27
26.5	18.830 ^s	59.40	51.503 ^s	67.68	12.072 ^s	32.90
Dec. 6.4	19.022 ^s	60.61	51.742 ^s	67.01	12.265 ^s	33.75
16.4	19.258 ^s	62.00	52.036 ^s	66.64	12.502 ^s	34.80
26.4	19.531 ^s	63.54	52.376 ^s	66.58	12.779 ^s	36.03
36.3	19.833 ^s	65.19	52.754 ^s	66.85	13.085 ^s	37.41
Mean Place	17.399	45.82	50.115	56.04	10.614	19.92
Sec δ , Tan δ	1.013	—0.161	1.313	—0.851	1.035	—0.266
a, a'	+3.2	—13.3	+3.9	—13.1	+3.3	—12.9
b, b'	+0.01	+0.7	+0.04	+0.8	+0.01	+0.8
Authority and Catalogue No.	B.J.	920	A.N.	923	N.A.	926

† First transit, May 11.

APPARENT PLACES OF STARS, 1931.

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AT UPPER TRANSIT AT GREENWICH.

Name Mag. Spect.	γ Ursæ Minoris		ι Draconis		32 Libræ	
	3·14	A2	3·47	Ko	5·92	Ko
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 15 ^m 20	[°] +72 ['] 04	^h 15 ^m 23	[°] +59 ['] 11	^h 15 ^m 24	[°] -16 ['] 28
Jan. 1·4	47·41 ^s 62	26·28 ^s 279	22·063 ^s 420	67·26 ^s 293	20·225 ^s 320	39·40 ^s 137
11·3	48·03 69	23·49 226	22·483 464	64·33 243	20·545 335	40·77 146
21·3	48·72 75	21·23 166	22·947 494	61·90 186	20·880 343	42·23 149
31·3	49·47 78	19·57 100	23·441 507	60·04 122	21·223 340	43·72 146
Feb. 10·3	50·25 77	18·57 32	23·948 503	58·82 55	21·563 332	45·18 140
20·2	51·02 75	18·25 37	24·451 486	58·27 12	21·895 317	46·58 129
Mar. 2·2	51·77 70	18·62 102	24·937 453	58·39 78	22·212 298	47·87 115
12·2	52·47 63	19·64 162	25·390 410	59·17 138	22·510 275	49·02 99
22·1	53·10 53	21·26 213	25·800 357	60·55 191	22·785 251	50·01 83
Apr. 1·1	53·63 43	23·39 256	26·157 295	62·46 235	23·036 224	50·84 66
11·1	54·06 32	25·95 287	26·452 231	64·81 270	23·260 196	51·50 51
21·1	54·38 20	28·82 307	26·683 163	67·51 293	23·456 168	52·01 39
May 1·0	54·58 8	31·89 316	26·846 94	70·44 305	23·624 140	52·40 26
11·0	54·66 13	35·05 313	26·940 26	73·49 307	23·764 110	52·66 15
20·9	54·62 16	38·18 300	26·966 41	76·56 297	23·874 79	52·81 6
30·9	54·46 27	41·18 277	26·925 104	79·53 279	23·953 47	52·87 1
June 9·9	54·19 37	43·95 247	26·821 163	82·32 252	24·000 16	52·86 7
19·9	53·82 45	46·42 209	26·658 217	84·84 219	24·016 15	52·79 13
29·9	53·37 53	48·51 166	26·441 265	87·03 179	24·001 46	52·66 18
July 9·8	52·84 60	50·17 119	26·176 306	88·82 134	23·955 74	52·48 23
19·8	52·24 64	51·36 69	25·870 339	90·16 87	23·881 99	52·25 28
29·8	51·60 68	52·05 16	25·531 364	91·03 37	23·782 120	51·97 32
Aug. 8·8	50·92 69	52·21 36	25·167 379	91·40 14	23·662 135	51·65 35
18·7	50·23 70	51·85 89	24·788 383	91·26 65	23·527 144	51·30 38
28·7	49·53 67	50·96 140	24·405 376	90·61 116	23·383 144	50·92 39
Sept. 7·7	48·86 64	49·56 189	24·029 358	89·45 164	23·239 135	50·53 38
17·7	48·22 59	47·67 235	23·671 328	87·81 211	23·104 118	50·15 35
27·6	47·63 52	45·32 277	23·343 286	85·70 254	22·986 92	49·80 28
Oct. 7·6	47·11 44	42·55 313	23·057 230	83·16 293	22·894 56	49·52 18
17·6	46·67 33	39·42 344	22·827 166	80·23 326	22·838 13	49·34 5
27·5	46·34 21	35·98 367	22·661 92	76·97 353	22·825 36	49·29 11
Nov. 6·5	46·13 8	32·31 383	22·569 11	73·44 372	22·861 87	49·40 31
16·5	46·05 4	28·48 389	22·558 74	69·72 383	22·948 139	49·71 52
26·5	46·09 18	24·59 385	22·632 158	65·89 382	23·087 189	50·23 73
Dec. 6·4	46·27 32	20·74 369	22·790 241	62·07 372	23·276 236	50·96 94
16·4	46·59 44	17·05 344	23·031 317	58·35 350	23·512 274	51·90 112
26·4	47·03 55	13·61 306	23·348 382	54·85 316	23·786 306	53·02 129
36·4	47·58	10·55	23·730	51·69	24·092	54·31
Mean Place	49·242	46·25	23·399	86·05	21·624	37·36
Sec δ, Tan δ	3·250	+3·092	1·953	+1·678	1·043	-0·296
a, a'	-0·1	-12·8	+1·3	-12·7	+3·4	-12·6
b, b'	-0·13	+0·8	-0·07	+0·8	+0·01	+0·8
Authority and Catalogue No.	B.J.	928	B.J.	931	N.A.	933

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name Mag. Spect.	γ Lupi <i>m.</i>		α Coronæ Borealis		α Serpentis	
	2.95	B ₃	2.31	A ₀	2.75	K ₀
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ^m 15 30	[°] ['] -40 56	^h ^m 15 31	[°] ['] +26 56	^h ^m 15 40	[°] ['] +6 38
Jan. 1.4	30.135 ^s 387	06.17 32	44.717 ^s 301	32.18 272	50.745 ^s 289	21.23 217
11.3	30.522 409	06.49 62	45.018 324	29.46 241	51.034 309	19.06 204
21.3	30.931 419	07.11 89	45.342 337	27.05 203	51.343 319	17.02 184
31.3	31.350 418	08.00 112	45.679 339	25.02 158	51.662 322	15.18 158
Feb. 10.3	31.768 410	09.12 132	46.018 335	23.44 108	51.984 316	13.60 126
20.2	32.178 394	10.44 147	46.353 322	22.36 56	52.300 305	12.34 92
Mar. 2.2	32.572 371	11.91 159	46.675 302	21.80 3	52.605 289	11.42 55
12.2	32.943 346	13.50 166	46.977 279	21.77 47	52.894 269	10.87 19
22.2	33.289 317	15.16 171	47.256 250	22.24 94	53.163 246	10.68 16
Apr. 1.1	33.606 285	16.87 171	47.506 219	23.18 134	53.409 221	10.84 48
11.1	33.891 252	18.58 172	47.725 187	24.52 167	53.630 194	11.32 74
21.1	34.143 216	20.30 169	47.912 154	26.19 193	53.824 167	12.06 96
May 1.0	34.359 179	21.99 164	48.066 119	28.12 209	53.991 138	13.02 112
11.0	34.538 140	23.63 157	48.185 85	30.21 219	54.129 109	14.14 123
20.9	34.678 100	25.20 147	48.270 50	32.40 219	54.238 78	15.37 128
30.9	34.778 58	26.67 135	48.320 15	34.59 212	54.316 48	16.65 128
June 9.9	34.836 17	28.02 121	48.335 19	36.71 199	54.364 16	17.93 125
19.9	34.853 25	29.23 103	48.316 51	38.70 181	54.380 15	19.18 117
29.9	34.828 66	30.26 83	48.265 82	40.51 156	54.365 44	20.35 106
July 9.9	34.762 103	31.09 62	48.183 111	42.07 129	54.321 73	21.41 92
19.8	34.659 137	31.71 37	48.072 135	43.36 97	54.248 98	22.33 76
29.8	34.522 164	32.08 11	47.937 156	44.33 65	54.150 119	23.09 59
Aug. 8.8	34.358 184	32.19 15	47.781 171	44.98 29	54.031 136	23.68 41
18.7	34.174 195	32.04 42	47.610 179	45.27 7	53.895 147	24.09 21
28.7	33.979 196	31.62 67	47.431 179	45.20 43	53.748 150	24.30 1
Sept. 7.7	33.783 184	30.95 90	47.252 172	44.77 81	53.598 144	24.29 22
17.7	33.599 162	30.05 109	47.080 155	43.96 118	53.454 130	24.07 45
27.6	33.437 128	28.96 125	46.925 132	42.78 153	53.324 108	23.62 69
Oct. 7.6	33.309 83	27.71 132	46.793 96	41.25 187	53.216 77	22.93 93
17.6	33.226 29	26.39 135	46.697 55	39.38 219	53.139 38	22.00 118
27.6	33.197 32	25.04 130	46.642 8	37.19 248	53.101 6	20.82 142
Nov. 6.5	33.229 96	23.74 119	46.634 45	34.71 271	53.107 55	19.40 165
16.5	33.325 162	22.55 100	46.679 98	32.00 290	53.162 105	17.75 186
26.5	33.487 225	21.55 78	46.777 150	29.10 302	53.267 154	15.89 202
Dec. 6.4	33.712 282	20.77 50	46.927 201	26.08 304	53.421 199	13.87 214
16.4	33.994 331	20.27 20	47.128 246	23.04 299	53.620 240	11.73 220
26.4	34.325 370	20.07 12	47.374 282	20.05 284	53.860 273	09.53 219
36.4	34.695	20.19	47.656	17.21	54.133	07.34
Mean Place	32.071	09.65	45.870	45.32	52.000	29.73
Sec δ , Tan δ	1.324	-0.867	1.122	+0.508	1.007	+0.116
<i>a</i> , <i>a'</i>	+4.0	-12.2	+2.5	-12.1	+2.9	-11.4
<i>b</i> , <i>b'</i>	+0.04	+0.8	-0.02	+0.8	0.00	+0.8
Authority and Catalogue No.	B.J.	941	B.J.	943	B.J.	951

APPARENT PLACES OF STARS, 1931.

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AT UPPER TRANSIT AT GREENWICH.

Name Mag. Spect.	μ Serpentis		ζ Ursæ Minoris		ϵ Serpentis	
	3.63	Ao	4.34	A2	3.75	A2
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ^m 15 45	[°] ['] — 3 13	^h ^m 15 46	[°] ['] +77 59	^h ^m 15 47	[°] ['] +4 40
Jan. 1.4	59.629 ^s	19.25 ["]	25.60 ^s	67.77 ["]	21.138 ^s	55.23 ["]
11.4	59.920 ²⁹¹	21.05 ¹⁸⁰	26.36 ⁷⁶	64.83 ²⁹⁴	21.424 ²⁸⁶	53.14 ²⁰⁹
21.3	60.231 ³¹¹	22.81 ¹⁷⁶	27.25 ⁸⁹	62.39 ²⁴⁴	21.730 ³⁰⁶	51.16 ¹⁹⁸
31.3	60.552 ³²¹	24.47 ¹⁶⁶	28.26 ¹⁰¹	60.52 ¹⁸⁷	22.047 ³¹⁷	49.35 ¹⁸¹
Feb. 10.3	60.876 ³²⁴	25.97 ¹⁵⁰	29.33 ¹⁰⁷	59.28 ¹²⁴	22.368 ³²¹	47.79 ¹⁵⁶
	319	128	109	57	316	127
20.2	61.195 ³⁰⁸	27.25 ¹⁰⁴	30.42 ¹⁰⁹	58.71 ¹¹	22.684 ³⁰⁷	46.52 ⁹⁴
Mar. 2.2	61.503 ²⁹³	28.29 ⁷⁷	31.51 ¹⁰⁴	58.82 ⁷⁸	22.991 ²⁹¹	45.58 ⁶⁰
12.2	61.796 ²⁷³	29.06 ⁴⁹	32.55 ⁹⁵	59.60 ¹³⁹	23.282 ²⁷²	44.98 ²⁵
22.2	62.069 ²⁵²	29.55 ²²	33.50 ⁸⁴	60.99 ¹⁹⁴	23.554 ²⁵⁰	44.73 ⁹
Apr. 1.1	62.321 ²²⁹	29.77 ⁴	34.34 ⁶⁹	62.93 ²⁴⁰	23.804 ²²⁶	44.82 ³⁹
11.1	62.550 ²⁰³	29.73 ²⁵	35.03 ⁵³	65.33 ²⁷⁶	24.030 ²⁰⁰	45.21 ⁶⁵
21.1	62.753 ¹⁷⁷	29.48 ⁴⁴	35.56 ³⁵	68.09 ³⁰¹	24.230 ¹⁷⁴	45.86 ⁸⁷
May 1.1	62.930 ¹⁴⁹	29.04 ⁵⁸	35.91 ¹⁸	71.10 ³¹⁴	24.404 ¹⁴⁶	46.73 ¹⁰³
11.0	63.079 ¹²⁰	28.46 ⁶⁹	36.09 ¹	74.24 ³¹⁶	24.550 ¹¹⁶	47.76 ¹¹⁴
20.9	63.199 ⁹¹	27.77 ⁷⁶	36.08 ²⁰	77.40 ³⁰⁸	24.666 ⁸⁶	48.00 ¹²⁰
30.9	63.290 ⁵⁹	27.01 ⁷⁹	35.88 ³⁶	80.48 ²⁹¹	24.752 ⁵⁵	50.10 ¹²¹
June 9.9	63.349 ²⁸	26.22 ⁷⁸	35.52 ⁵²	83.39 ²⁶⁴	24.807 ²⁴	51.31 ¹¹⁸
19.9	63.377 ⁴	25.44 ⁷⁷	35.00 ⁶⁵	86.03 ²³⁰	24.831 ⁸	52.49 ¹¹¹
29.9	63.373 ³⁴	24.67 ⁷¹	34.35 ⁷⁹	88.33 ¹⁹⁰	24.823 ³⁹	53.60 ¹⁰¹
July 9.9	63.339 ⁶⁴	23.96 ⁶⁵	33.56 ⁹⁰	90.23 ¹⁴⁵	24.784 ⁶⁸	54.61 ⁸⁹
19.8	63.275 ⁹⁰	23.31 ⁵⁷	32.66 ⁹⁹	91.68 ⁹⁷	24.716 ⁹⁴	55.50 ⁷⁵
29.8	63.185 ¹¹³	22.74 ⁴⁸	31.67 ¹⁰⁴	92.65 ⁴⁷	24.622 ¹¹⁷	56.25 ⁵⁹
Aug. 8.8	63.072 ¹³¹	22.26 ³⁹	30.63 ¹⁰⁹	93.12 ⁶	24.505 ¹³⁴	56.84 ⁴³
18.8	62.941 ¹⁴²	21.87 ²⁷	29.54 ¹¹⁰	93.06 ⁵⁸	24.371 ¹⁴⁶	57.27 ²⁴
28.7	62.799 ¹⁴⁷	21.60 ¹⁶	28.44 ¹⁰⁹	92.48 ¹⁰⁹	24.225 ¹⁵⁰	57.51 ⁵
Sept. 7.7	62.652 ¹⁴²	21.44 ³	27.35 ¹⁰⁶	91.39 ¹⁵⁹	24.075 ¹⁴⁵	57.56 ¹⁶
17.7	62.510 ¹²⁸	21.41 ¹²	26.29 ⁹⁹	89.80 ²⁰⁶	23.930 ¹³²	57.40 ³⁷
27.6	62.382 ¹⁰⁷	21.53 ²⁸	25.30 ⁹⁰	87.74 ²⁵⁰	23.798 ¹¹¹	57.03 ⁶⁰
Oct. 7.6	62.275 ⁷⁵	21.81 ⁴⁶	24.40 ⁷⁸	85.24 ²⁸⁹	23.687 ⁸⁰	56.43 ⁸²
17.6	62.200 ³⁶	22.27 ⁶⁵	23.62 ⁶⁵	82.35 ³²³	23.607 ⁴²	55.61 ¹⁰⁶
27.6	62.164 ⁸	22.92 ⁸⁶	22.97 ⁴⁹	79.12 ³⁵⁰	23.565 ¹	54.55 ¹²⁹
Nov. 6.5	62.172 ⁵⁶	23.78 ¹⁰⁷	22.48 ³¹	75.62 ³⁶⁹	23.566 ⁵⁰	53.26 ¹⁵²
16.5	62.228 ¹⁰⁷	24.85 ¹²⁶	22.17 ¹¹	71.93 ³⁸⁰	23.616 ¹⁰⁰	51.74 ¹⁷²
26.5	62.335 ¹⁵⁷	26.11 ¹⁴⁵	22.06 ⁸	68.13 ³⁸¹	23.716 ¹⁴⁹	50.02 ¹⁹⁰
Dec. 6.5	62.492 ²⁰²	27.56 ¹⁶¹	22.14 ²⁸	64.32 ³⁷¹	23.865 ¹⁹⁵	48.12 ²⁰³
16.4	62.694 ²⁴²	29.17 ¹⁷¹	22.42 ⁴⁷	60.61 ³⁴⁹	24.060 ²³⁵	46.09 ²⁰⁹
26.4	62.936 ²⁷⁵	30.88 ¹⁷⁸	22.89 ⁶⁶	57.12 ³¹⁷	24.295 ²⁶⁹	44.00 ²¹⁰
36.4	63.211	32.66	23.55	53.95	24.564	41.90
Mean Place	60.972	13.02	28.813	87.19	22.432	63.39
Sec δ, Tan δ	1.002	-0.056	4.813	+4.708	1.003	+0.082
a, a'	+3.1	-11.1	-2.2	-11.0	+3.0	-11.0
b, b'	0.00	+0.8	-0.17	+0.8	0.00	+0.8
Authority and Catalogue No.	B.J.	955	B.J.	957	B.J.	958

† Second transit, May 20.

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name	β Trianguli Australis		γ Serpentis		π Scorpii	
	3.04	Fo	3.86	F5	3.00	B2
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ₁₅ ^m ₄₈	[°] ₋₆₃ ['] ₁₃	^h ₁₅ ^m ₅₃	[°] ₊₁₅ ['] ₅₂	^h ₁₅ ^m ₅₄	[°] ₋₂₅ ['] ₅₅
Jan. 1.4	^s _{59.29}	["] _{04.44}	^s _{14.530}	["] _{57.62}	^s _{38.674}	["] _{01.54}
11.4	_{59.86} ₅₇	_{03.65} ₇₉	_{14.810} ₂₈₀	_{55.13} ₂₄₉	_{38.994} ₃₂₀	_{02.31} ₇₇
21.3	_{60.47} ₆₁	_{03.28} ₃₇	_{15.112} ₃₀₂	_{52.83} ₂₃₀	_{39.336} ₃₄₂	_{03.24} ₉₃
31.3	_{61.11} ₆₄	_{03.34} ₆	_{15.429} ₃₁₇	_{50.81} ₂₀₂	_{39.691} ₃₅₅	_{04.29} ₁₀₅
Feb. 10.3	_{61.76} ₆₅	_{03.82} ₄₈	_{15.751} ₃₂₂	_{49.13} ₁₆₈	_{40.050} ₃₅₉	_{05.42} ₁₁₃
	₆₅	₈₈	₃₂₁	₁₂₈	₃₅₅	₁₁₆
20.2	_{62.41} ₆₃	_{04.70} ₁₂₅	_{16.072} ₃₁₁	_{47.85} ₈₅	_{40.405} ₃₄₅	_{06.58} ₁₁₇
Mar. 2.2	_{63.04} ₆₁	_{05.95} ₁₅₇	_{16.383} ₂₉₇	_{47.00} ₄₀	_{40.750} ₃₃₀	_{07.75} ₁₁₃
12.2	_{63.65} ₅₇	_{07.52} ₁₈₅	_{16.680} ₂₇₈	_{46.60} ₄	_{41.080} ₃₁₂	_{08.88} ₁₀₇
22.2	_{64.22} ₅₃	_{09.37} ₂₁₀	_{16.958} ₂₅₆	_{46.64} ₄₅	_{41.392} ₂₈₉	_{09.95} ₁₀₁
Apr. 1.1	_{64.75} ₄₈	_{11.47} ₂₃₀	_{17.214} ₂₃₁	_{47.09} ₈₂	_{41.681} ₂₆₆	_{10.96} ₉₃
11.1	_{65.23} ₄₂	_{13.77} ₂₄₅	_{17.445} ₂₀₄	_{47.91} ₁₁₄	_{41.947} ₂₃₉	_{11.89} ₈₅
21.1	_{65.65} ₃₆	_{16.22} ₂₅₆	_{17.649} ₁₇₆	_{49.05} ₁₄₀	_{42.186} ₂₁₂	_{12.74} ₇₇
May 1.1	_{66.01} ₃₀	_{18.78} ₂₆₁	_{17.825} ₁₄₆	_{50.45} ₁₅₈	_{42.398} ₁₈₁	_{13.51} ₇₀
11.0	_{66.31} ₂₃	_{21.39} ₂₆₂	_{17.971} ₁₁₄	_{52.03} ₁₆₉	_{42.579} ₁₅₀	_{14.21} ₆₂
21.0	_{66.54} ₁₆	_{24.01} ₂₅₈	_{18.085} ₈₂	_{53.72} ₁₇₅	_{42.729} ₁₁₆	_{14.83} ₅₅
30.9	_{66.70} ₈	_{26.59} ₂₄₈	_{18.167} ₅₀	_{55.47} ₁₇₃	_{42.845} ₈₂	_{15.38} ₄₉
June 9.9	_{66.78} _—	_{29.07} ₂₃₂	_{18.217} ₁₇	_{57.20} ₁₆₆	_{42.927} ₄₅	_{15.87} ₄₂
19.9	_{66.78} ₆	_{31.39} ₂₁₀	_{18.234} ₁₆	_{58.86} ₁₅₄	_{42.972} ₉	_{16.29} ₃₄
29.9	_{66.72} ₁₄	_{33.49} ₁₈₄	_{18.218} ₄₈	_{60.40} ₁₃₈	_{42.981} ₂₈	_{16.63} ₂₅
July 9.9	_{66.58} ₂₁	_{35.33} ₁₅₂	_{18.170} ₇₈	_{61.78} ₁₁₈	_{42.953} ₆₃	_{16.88} ₁₆
19.8	_{66.37} ₂₇	_{36.85} ₁₁₇	_{18.092} ₁₀₅	_{62.96} ₉₆	_{42.890} ₉₃	_{17.04} ₅
29.8	_{66.10} ₃₁	_{38.02} ₇₆	_{17.987} ₁₂₉	_{63.92} ₇₀	_{42.797} ₁₂₁	_{17.09} ₆
Aug. 8.8	_{65.79} ₃₅	_{38.78} ₃₃	_{17.858} ₁₄₇	_{64.62} ₄₃	_{42.676} ₁₄₃	_{17.03} ₁₇
18.8	_{65.44} ₃₇	_{39.11} ₁₁	_{17.711} ₁₅₈	_{65.05} ₁₆	_{42.533} ₁₅₇	_{16.86} ₂₈
28.7	_{65.07} ₃₇	_{39.00} ₅₅	_{17.553} ₁₆₃	_{65.21} ₁₃	_{42.376} ₁₆₂	_{16.58} ₃₉
Sept. 7.7	_{64.70} ₃₆	_{38.45} ₉₈	_{17.390} ₁₆₀	_{65.08} ₄₃	_{42.214} ₁₅₉	_{16.19} ₄₈
17.7	_{64.34} ₃₃	_{37.47} ₁₃₈	_{17.230} ₁₄₇	_{64.65} ₇₃	_{42.055} ₁₄₄	_{15.71} ₅₅
27.6	_{64.01} ₂₇	_{36.09} ₁₇₃	_{17.083} ₁₂₆	_{63.92} ₁₀₃	_{41.911} ₁₂₀	_{15.16} ₅₉
Oct. 7.6	_{63.74} ₂₀	_{34.36} ₂₀₀	_{16.957} ₉₆	_{62.89} ₁₃₄	_{41.791} ₈₆	_{14.57} ₅₉
17.6	_{63.54} ₁₂	_{32.36} ₂₂₀	_{16.861} ₅₉	_{61.55} ₁₆₂	_{41.705} ₄₃	_{13.98} ₅₄
27.6	_{63.42} ₃	_{30.16} ₂₃₀	_{16.802} ₁₄	_{59.93} ₁₉₀	_{41.662} ₈	_{13.44} ₄₆
Nov. 6.5	_{63.39} ₈	_{27.86} ₂₃₂	_{16.788} ₃₄	_{58.03} ₂₁₄	_{41.670} ₆₁	_{12.98} ₃₃
16.5	_{63.47} ₁₉	_{25.54} ₂₂₃	_{16.822} ₈₅	_{55.89} ₂₃₅	_{41.731} ₁₁₆	_{12.65} ₁₆
26.5	_{63.66} ₂₈	_{23.31} ₂₀₅	_{16.907} ₁₃₅	_{53.54} ₂₅₁	_{41.847} ₁₇₂	_{12.49} ₂
Dec. 6.5	_{63.94} ₃₈	_{21.26} ₁₇₈	_{17.042} ₁₈₃	_{51.03} ₂₆₀	_{42.019} ₂₂₃	_{12.51} ₂₃
16.4	_{64.32} ₄₇	_{19.48} ₁₄₅	_{17.225} ₂₂₅	_{48.43} ₂₆₂	_{42.242} ₂₆₆	_{12.74} ₄₅
26.4	_{64.79} ₅₃	_{18.03} ₁₀₈	_{17.450} ₂₆₁	_{45.81} ₂₅₅	_{42.508} ₃₀₃	_{13.19} ₆₄
36.4	_{65.32}	_{16.95}	_{17.711}	_{43.26}	_{42.811}	_{13.83}
Mean Place	62.665	10.31	15.804	68.43	40.336	00.23
Sec δ , Tan δ	2.219	-1.981	1.040	+0.285	1.112	-0.486
a , a'	+5.3	-10.8	+2.7	-10.5	+3.6	-10.4
b , b'	+0.07	+0.8	-0.01	+0.9	+0.02	+0.9
Authority and Catalogue No.	B.J.	959	A.N.	963	A.N.	964

‡ Second transit, May 20.

† First transit, May 21.

APPARENT PLACES OF STARS, 1931.

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AT UPPER TRANSIT AT GREENWICH.

Name	δ Scorpii		β ¹ Scorpii		δ Ophiuchi	
	2.54	Bo	2.90	Br	3.03	Ma
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ₁₅ ^m ₅₆	[°] ₋₂₂ ['] ₂₅	^h ₁₆ ^m ₀₁	[°] ₋₁₉ ['] ₃₇	^h ₁₆ ^m ₁₀	[°] ₋₃ ['] ₃₁
Jan. 1.4	^s _{13.305} ₃₁₂	["] _{37.95} ₉₃	^s _{23.657} ₃₀₄	["] _{07.43} ₁₀₃	^s _{42.164} ₂₇₆	["] _{11.48} ₁₇₁
11.4	_{13.617} ₃₃₄	_{38.88} ₁₀₅	_{23.961} ₃₂₅	_{08.46} ₁₁₂	_{42.440} ₂₉₈	_{13.19} ₁₆₈
21.3	_{13.951} ₃₄₆	_{39.93} ₁₁₄	_{24.286} ₃₃₈	_{09.58} ₁₁₈	_{42.738} ₃₁₂	_{14.87} ₁₅₉
31.3	_{14.297} ₃₅₀	_{41.07} ₁₁₈	_{24.624} ₃₄₃	_{10.76} ₁₁₉	_{43.050} ₃₁₉	_{16.46} ₁₄₃
Feb. 10.3	_{14.647} ₃₄₇	_{42.25} ₁₁₈	_{24.967} ₃₄₁	_{11.95} ₁₁₇	_{43.369} ₃₁₉	_{17.89} ₁₂₃
20.3	_{14.994} ₃₃₇	_{43.43} ₁₁₄	_{25.308} ₃₃₂	_{13.12} ₁₀₉	_{43.688} ₃₁₂	_{19.12} ₉₈
Mar. 2.2	_{15.331} ₃₂₂	_{44.57} ₁₀₇	_{25.640} ₃₁₈	_{14.21} ₉₉	_{44.000} ₃₀₁	_{20.10} ₇₂
12.2	_{15.653} ₃₀₄	_{45.64} ₉₈	_{25.958} ₃₀₁	_{15.20} ₈₈	_{44.301} ₂₈₅	_{20.82} ₄₄
22.2	_{15.957} ₂₈₃	_{46.62} ₈₈	_{26.259} ₂₈₁	_{16.08} ₇₅	_{44.586} ₂₆₈	_{21.26} ₁₇
Apr. 1.1	_{16.240} ₂₅₉	_{47.50} ₇₆	_{26.540} ₂₅₈	_{16.83} ₆₂	_{44.854} ₂₄₆	_{21.43} ₈
11.1	_{16.499} ₂₃₄	_{48.26} ₆₇	_{26.798} ₂₃₄	_{17.45} ₅₀	_{45.100} ₂₂₃	_{21.35} ₃₀
21.1	_{16.733} ₂₀₇	_{48.93} ₅₇	_{27.032} ₂₀₈	_{17.95} ₄₀	_{45.323} ₁₉₉	_{21.05} ₄₉
May 1.1	_{16.940} ₁₇₉	_{49.50} ₄₉	_{27.240} ₁₈₀	_{18.35} ₃₀	_{45.522} ₁₇₂	_{20.56} ₆₄
11.0	_{17.119} ₁₄₈	_{49.99} ₄₁	_{27.420} ₁₅₀	_{18.65} ₂₃	_{45.694} ₁₄₄	_{19.92} ₇₄
21.0	_{17.267} ₁₁₅	_{50.40} ₃₄	_{27.570} ₁₁₈	_{18.88} ₁₆	_{45.838} ₁₁₄	_{19.18} ₈₁
30.9	_{17.382} ₈₁	_{50.74} ₂₈	_{27.688} ₈₅	_{19.04} ₁₀	_{45.952} ₈₂	_{18.37} ₈₃
June 9.9	_{17.463} ₄₆	_{51.02} ₂₂	_{27.773} ₅₀	_{19.14} ₆	_{46.034} ₄₉	_{17.54} ₈₃
19.9	_{17.509} ₁₀	_{51.24} ₁₆	_{27.823} ₁₄	_{19.20} ₂	_{46.083} ₁₅	_{16.71} ₈₁
29.9	_{17.519} ₂₅	_{51.40} ₁₀	_{27.837} ₂₁	_{19.22} ₂	_{46.098} ₁₈	_{15.90} ₇₅
July 9.9	_{17.494} ₅₈	_{51.50} ₃	_{27.816} ₅₄	_{19.20} ₇	_{46.080} ₄₉	_{15.15} ₆₈
19.8	_{17.436} ₉₀	_{51.53} ₄	_{27.762} ₈₅	_{19.13} ₁₂	_{46.031} ₈₀	_{14.47} ₅₉
29.8	_{17.346} ₁₁₇	_{51.49} ₁₃	_{27.677} ₁₁₃	_{19.01} ₁₇	_{45.951} ₁₀₆	_{13.88} ₅₀
Aug. 8.8	_{17.229} ₁₃₈	_{51.36} ₂₀	_{27.564} ₁₃₄	_{18.84} ₂₂	_{45.845} ₁₂₇	_{13.38} ₄₁
18.8	_{17.091} ₁₅₃	_{51.16} ₂₈	_{27.430} ₁₄₉	_{18.62} ₂₇	_{45.718} ₁₄₃	_{12.97} ₂₉
28.7	_{16.938} ₁₅₈	_{50.88} ₃₆	_{27.281} ₁₅₆	_{18.35} ₃₂	_{45.575} ₁₅₁	_{12.68} ₁₇
Sept. 7.7	_{16.780} ₁₅₅	_{50.52} ₄₁	_{27.125} ₁₅₃	_{18.03} ₃₅	_{45.424} ₁₅₁	_{12.51} ₅
17.7	_{16.625} ₁₄₁	_{50.11} ₄₅	_{26.972} ₁₄₁	_{17.68} ₃₅	_{45.273} ₁₄₀	_{12.46} ₉
27.7	_{16.484} ₁₁₈	_{49.66} ₄₇	_{26.831} ₁₁₉	_{17.33} ₃₄	_{45.133} ₁₂₂	_{12.55} ₂₅
Oct. 7.6	_{16.366} ₈₄	_{49.19} ₄₃	_{26.712} ₈₇	_{16.99} ₃₀	_{45.011} ₉₃	_{12.80} ₄₂
17.6	_{16.282} ₄₃	_{48.76} ₃₆	_{26.625} ₄₇	_{16.69} ₂₂	_{44.918} ₅₇	_{13.22} ₆₀
27.6	_{16.239} ₅	_{48.40} ₂₆	_{26.578} _—	_{16.47} ₁₀	_{44.861} ₁₄	_{13.82} ₇₉
Nov. 6.5	_{16.244} ₅₈	_{48.14} ₁₃	_{26.578} ₅₁	_{16.37} ₄	_{44.847} ₃₃	_{14.61} ₉₈
16.5	_{16.302} ₁₁₃	_{48.01} ₅	_{26.629} ₁₀₅	_{16.41} ₂₁	_{44.880} ₈₃	_{15.59} ₁₁₈
26.5	_{16.415} ₁₆₆	_{48.06} ₂₄	_{26.734} ₁₅₈	_{16.62} ₃₉	_{44.963} ₁₃₃	_{16.77} ₁₃₆
Dec. 6.5	_{16.581} ₂₁₅	_{48.30} ₄₄	_{26.892} ₂₀₆	_{17.01} ₅₈	_{45.096} ₁₇₉	_{18.13} ₁₅₀
16.4	_{16.796} ₂₅₉	_{48.74} ₆₃	_{27.098} ₂₅₀	_{17.59} ₇₇	_{45.275} ₂₂₂	_{19.63} ₁₆₂
26.4	_{17.055} ₂₉₅	_{49.37} ₈₁	_{27.348} ₂₈₆	_{18.36} ₉₂	_{45.497} ₂₅₈	_{21.25} ₁₆₈
36.4	_{17.350}	_{50.18}	_{27.634}	_{19.28}	_{45.755}	_{22.93}
Mean Place	14.912	35.80	25.238	04.40	43.601	04.59
Sec δ, Tan δ	1.082	-0.413	1.062	-0.356	1.002	-0.062
a, a'	+3.5	-10.3	+3.5	-9.9	+3.1	-9.2
b, b'	+0.01	+0.9	+0.01	+0.9	0.00	+0.9
Authority and Catalogue No.	B.J.	967	B.J.	972	B.J.	983

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name	ε Ophiuchi		γ ² Normæ		σ Scorpii	
	3·34 Ko		4·14 Ko		3·10 Bi	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 16 ^m 14	[°] —4 ['] 31	^h 16 ^m 14	[°] —49 ['] 59	^h 16 ^m 16	[°] —25 ['] 25
Jan. 1·4	38 ^s ·587	38 ["] ·81	37 ^s ·631	15 ["] ·07	57 ^s ·647	45 ["] ·64
11·4	38·861 ²⁷⁴	40·46 ¹⁶⁵	38·035 ⁴⁰⁴	14·54 ⁵³	57·950 ³⁰³	46·28 ⁶⁴
21·3	39·158 ²⁹⁷	42·09 ¹⁶³	38·474 ⁴³⁹	14·33 ²¹	58·279 ³²⁹	47·05 ⁷⁷
31·3	39·470 ³¹²	43·63 ¹⁵⁴	38·937 ⁴⁶³	14·43 ¹⁰	58·624 ³⁴⁵	47·93 ⁸⁸
Feb. 10·3	39·789 ³¹⁹	45·02 ¹³⁹	39·411 ⁴⁷⁴	14·83 ⁴⁰	58·977 ³⁵³	48·89 ⁹⁶
	319	121	477	68	354	99
20·3	40·108	46·23	39·888	15·51	59·331	49·88
Mar. 2·2	40·422 ³¹⁴	47·20 ⁹⁷	40·358 ⁴⁷⁰	16·44 ⁹³	59·679 ³⁴⁸	50·86 ⁹⁸
12·2	40·724 ³⁰²	47·92 ⁷²	40·813 ⁴⁵⁵	17·59 ¹¹⁵	60·015 ³³⁶	51·81 ⁹⁵
22·2	41·012 ²⁸⁸	48·37 ⁴⁵	41·248 ⁴³⁵	18·93 ¹³⁴	60·336 ³²¹	52·70 ⁸⁹
Apr. 1·2	41·282 ²⁷⁰	48·56 ¹⁹	41·658 ⁴¹⁰	20·43 ¹⁵⁰	60·640 ³⁰⁴	53·53 ⁸³
	250	6	380	163	281	76
11·1	41·532 ²²⁷	48·50	42·038	22·06	60·921	54·29
21·1	41·759 ²⁰³	48·23 ²⁷	42·384 ³⁴⁶	23·79 ¹⁷³	61·179 ²⁵⁸	54·98 ⁶⁹
May 1·1	41·962 ¹⁷⁷	47·77 ⁴⁶	42·692 ³⁰⁸	25·60 ¹⁸¹	61·412 ²³³	55·60 ⁶²
11·0	42·139 ¹⁴⁹	47·18 ⁵⁹	42·958 ²⁶⁶	27·46 ¹⁸⁶	61·615 ²⁰³	56·16 ⁵⁶
21·0	42·288 ¹¹⁹	46·48 ⁷⁰	43·179 ²²¹	29·33 ¹⁸⁷	61·788 ¹⁷³	56·67 ⁵¹
	27	77	172	186	140	46
30·9	42·407 ⁸⁷	45·71 ⁸⁰	43·351 ¹²²	31·19 ¹⁸¹	61·928 ¹⁰⁴	57·13 ⁴²
June 9·9	42·494 ⁵³	44·91 ⁷⁹	43·473 ⁶⁸	33·00 ¹⁷²	62·032 ⁶⁷	57·55 ³⁷
19·9	42·547 ²⁰	44·12 ⁷⁷	43·541 ¹³	34·72 ¹⁵⁹	62·099 ²⁹	57·92 ³¹
29·9	42·567 ¹⁴	43·35 ⁷²	43·554 ⁴⁰	36·31 ¹⁴¹	62·128 ¹⁰	58·23 ²⁶
July 9·9	42·553 ⁴⁷	42·63 ⁶⁵	43·514 ⁹²	37·72 ¹²⁰	62·118 ⁴⁶	58·49 ¹⁹
19·9	42·506 ⁷⁷	41·98 ⁵⁷	43·422 ¹⁴⁰	38·92 ⁹⁵	62·072 ⁸¹	58·68 ¹⁰
29·8	42·429 ¹⁰⁴	41·41 ⁴⁹	43·282 ¹⁸²	39·87 ⁶⁷	61·991 ¹¹²	58·78 ²
Aug. 8·8	42·325 ¹²⁷	40·92 ⁴⁰	43·100 ²¹⁴	40·54 ³	61·879 ¹³⁷	58·80 ⁸
18·8	42·198 ¹⁴²	40·52 ³⁰	42·886 ²³⁸	40·90 ³⁶	61·742 ¹⁵⁵	58·72 ¹⁸
28·7	42·056 ¹⁵¹	40·22 ¹⁸	42·648 ²⁴⁹	40·93 ³¹	61·587 ¹⁶⁴	58·54 ²⁹
Sept. 7·7	41·905 ¹⁵¹	40·04 ⁷	42·399 ²⁴⁶	40·62 ⁶⁴	61·423 ¹⁶⁵	58·25 ³⁷
17·7	41·754 ¹⁴²	39·97 ⁵	42·153 ²³⁰	39·98 ⁹⁴	61·258 ¹⁵⁵	57·88 ⁴⁴
27·7	41·612 ¹²³	40·02 ²¹	41·923 ¹⁹⁹	39·04 ¹²¹	61·103 ¹³³	57·44 ⁴⁹
Oct. 7·6	41·489 ⁹⁵	40·23 ³⁶	41·724 ¹⁵⁵	37·83 ¹⁴⁴	60·970 ¹⁰³	56·95 ⁵¹
17·6	41·394 ⁶⁰	40·59 ⁵⁴	41·569 ⁹⁹	36·39 ¹⁶⁰	60·867 ⁶²	56·44 ⁴⁹
27·6	41·334 ¹⁷	41·13 ⁷²	41·470 ³³	34·79 ¹⁶⁸	60·805 ¹⁵	55·95 ⁴²
Nov. 6·6	41·317 ³⁰	41·85 ⁹¹	41·437 ³⁹	33·11 ¹⁶⁹	60·790 ³⁸	55·53 ³³
16·5	41·347 ⁸⁰	42·76 ¹¹⁰	41·476 ¹¹⁵	31·42 ¹⁶³	60·828 ⁹²	55·20 ¹⁹
26·5	41·427 ¹³⁰	43·86 ¹²⁸	41·591 ¹⁹⁰	29·79 ¹⁴⁹	60·920 ¹⁴⁸	55·01 ²
Dec. 6·5	41·557 ¹⁷⁸	45·14 ¹⁴³	41·781 ²⁶⁰	28·30 ¹²⁹	61·068 ²⁰⁰	54·99 ¹⁵
16·4	41·735 ²¹⁹	46·57 ¹⁵⁵	42·041 ³²⁴	27·01 ¹⁰⁴	61·268 ²⁴⁶	55·14 ³⁴
26·4	41·954 ²⁵⁶	48·12 ¹⁶¹	42·365 ³⁷⁷	25·97 ⁷⁴	61·514 ²⁸⁵	55·48 ⁵²
36·4	42·210	49·73	42·742	25·23	61·799	56·00
Mean Place	40·045	32·02	40·104	16·93	59·370	42·99
Sec δ, Tan δ	1·003	—0·079	1·555	—1·191	1·107	—0·475
a, a'	+3·2	—8·9	+4·5	—8·9	+3·6	—8·7
b, b'	0·00	+0·9	+0·04	+0·9	+0·01	+0·9
Authority and Catalogue No.	B.J.	987	B.J.	986	A.N.	989

APPARENT PLACES OF STARS, 1931.

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AT UPPER TRANSIT AT GREENWICH.

Name	γ Herculis		γ Apodis		η Draconis	
	3.79	Fo	3.90	Ko	2.89	G5
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	$^h \ ^m \ ^s$ 16 18	$^{\circ} \ ' \ ''$ +19 18	$^h \ ^m \ ^s$ 16 22	$^{\circ} \ ' \ ''$ -78 44	$^h \ ^m \ ^s$ 16 23	$^{\circ} \ ' \ ''$ +61 39
Jan. 1.4	51.056 ^s	38.90	40.39 ^s	40.33 [']	00.97 ^s	55.00 [']
11.4	51.316 ^m	36.32	41.47 ^m	38.54 [']	01.31 ^m	51.67 [']
21.3	51.604 ^s	33.93	42.68 ^s	37.20 [']	01.72 ^s	48.73 [']
31.3	51.910 ^m	31.83	43.99 ^m	36.33 [']	02.19 ^m	46.30 [']
Feb. 10.3	52.228 ^s	30.10	45.37 ^s	35.95 [']	02.69 ^s	44.44 [']
20.3	52.548 ^m	28.78	46.78 ^m	36.06 [']	03.21 ^m	43.22 [']
Mar. 2.2	52.864 ^s	27.92	48.18 ^s	36.64 [']	03.73 ^s	42.68 [']
12.2	53.170 ^m	27.54	49.56 ^m	37.67 [']	04.24 ^m	42.82 [']
22.2	53.461 ^s	27.63	50.89 ^s	39.12 [']	04.73 ^s	43.63 [']
Apr. 1.2	53.733 ^m	28.17	52.14 ^m	40.95 [']	05.18 ^m	45.05 [']
11.1	53.982 ^s	29.13	53.29 ^s	43.13 [']	05.58 ^s	47.01 [']
21.1	54.207 ^m	30.44	54.32 ^m	45.59 [']	05.92 ^m	49.42 [']
May 1.1	54.404 ^s	32.03	55.22 ^s	48.29 [']	06.19 ^s	52.20 [']
11.0	54.572 ^m	33.85	55.97 ^m	51.18 [']	06.39 ^m	55.23 [']
21.0	54.708 ^s	35.80	56.56 ^s	54.18 [']	06.52 ^s	58.41 [']
30.9	54.811 ^m	37.82	56.97 ^m	57.24 [']	06.57 ^m	61.62 [']
June 9.9	54.880 ^s	39.84	57.20 ^s	60.29 [']	06.55 ^s	64.76 [']
19.9	54.913 ^m	41.79	57.25 ^m	63.25 [']	06.46 ^m	67.75 [']
29.9	54.910 ^s	43.63	57.11 ^s	66.06 [']	06.29 ^s	70.49 [']
July 9.9	54.873 ^m	45.29	56.80 ^m	68.63 [']	06.06 ^m	72.92 [']
19.9	54.803 ^s	46.74	56.32 ^s	70.90 [']	05.77 ^s	74.98 [']
29.8	54.702 ^m	47.94	55.68 ^m	72.79 [']	05.43 ^m	76.61 [']
Aug. 8.8	54.574 ^s	48.88	54.92 ^s	74.26 [']	05.04 ^s	77.78 [']
18.8	54.423 ^m	49.52	54.06 ^m	75.24 [']	04.62 ^m	78.46 [']
28.7	54.257 ^s	49.85	53.13 ^s	75.70 [']	04.18 ^s	78.62 [']
Sept. 7.7	54.082 ^m	49.87	52.17 ^m	75.62 [']	03.73 ^m	78.27 [']
17.7	53.906 ^s	49.56	51.22 ^s	75.00 [']	03.28 ^s	77.40 [']
27.7	53.739 ^m	48.92	50.32 ^m	73.85 [']	02.85 ^m	76.02 [']
Oct. 7.6	53.590 ^s	47.95	49.52 ^s	72.21 [']	02.45 ^s	74.16 [']
17.6	53.468 ^m	46.65	48.85 ^m	70.13 [']	02.09 ^m	71.83 [']
27.6	53.381 ^s	45.04	48.35 ^s	67.70 [']	01.80 ^s	69.08 [']
Nov. 6.6	53.337 ^m	43.14	48.05 ^m	65.01 [']	01.57 ^m	65.97 [']
16.5	53.341 ^s	40.97	47.96 ^s	62.16 [']	01.42 ^s	62.56 [']
26.5	53.395 ^m	38.58	48.11 ^m	59.26 [']	01.36 ^m	58.92 [']
Dec. 6.5	53.500 ^s	36.01	48.49 ^s	56.42 [']	01.39 ^s	55.15 [']
16.4	53.654 ^m	33.34	49.09 ^m	53.75 [']	01.51 ^m	51.36 [']
26.4	53.854 ^s	30.64	49.89 ^s	51.35 [']	01.72 ^s	47.65 [']
36.4	54.094 ^m	28.00	50.88 ^m	49.30 [']	02.02 ^m	44.16 [']
Mean Place	52.438	50.49	48.267	44.59	03.041	72.09
Sec δ , Tan δ	1.060	+0.350	5.124	-5.025	2.107	+1.855
a, a'	+2.6	-8.6	+9.2	-8.2	+0.8	-8.2
b, b'	-0.01	+0.9	+0.14	+0.9	-0.05	+0.9
Authority and Catalogue No.	B.J.	992	B.J.	998	B.J.	1001

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name	α Scorpii (<i>Antares</i>)		β Herculis		λ Ophiuchi <i>m.</i>	
	1·22	Ma—A3	2·81	Ko	3·85	Ao
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ₁₆ ^m ₂₅	[°] _{—26} ['] ₁₆	^h ₁₆ ^m ₂₇	[°] ₊₂₁ ['] ₃₇	^h ₁₆ ^m ₂₇	[°] ₊₂ ['] ₀₇
Jan. 1·4	08·583 ^s	52·00	13·677 ^s	67·79	24·394 ^s	53·16
11·4	08·884 ^s	52·55	13·930 ^s	65·13	24·653 ^s	51·26
21·4	09·210 ^s	53·23	14·213 ^s	62·67	24·936 ^s	49·43
31·3	09·554 ^s	54·03	14·516 ^s	60·51	25·237 ^s	47·74
Feb. 10·3	09·908 ^s	54·90	14·832 ^s	58·72	25·548 ^s	46·25
20·3	10·264 ^s	55·80	15·153 ^s	57·36	25·861 ^s	45·02
Mar. 2·2	10·615 ^s	56·71	15·472 ^s	56·48	26·171 ^s	44·09
12·2	10·956 ^s	57·60	15·782 ^s	56·10	26·473 ^s	43·47
22·2	11·283 ^s	58·45	16·078 ^s	56·21	26·762 ^s	43·19
Apr. 1·2	11·592 ^s	59·24	16·356 ^s	56·79	27·035 ^s	43·23
11·1	11·882 ^s	59·97	16·612 ^s	57·80	27·289 ^s	43·56
21·1	12·149 ^s	60·64	16·844 ^s	59·18	27·522 ^s	44·15
May 1·1	12·390 ^s	61·26	17·049 ^s	60·87	27·731 ^s	44·97
11·1	12·603 ^s	61·82	17·223 ^s	62·79	27·914 ^s	45·95
21·0	12·785 ^s	62·34	17·366 ^s	64·86	28·069 ^s	47·05
30·9	12·935 ^s	62·82	17·476 [†]	67·00	28·193 [†]	48·22
June 9·9	13·048 ^s	63·27	17·550 ^s	69·15	28·286 ^s	49·42
19·9	13·124 ^s	63·68	17·588 ^s	71·24	28·345 ^s	50·60
29·9	13·161 ^s	64·03	17·589 ^s	73·20	28·370 ^s	51·72
July 9·9	13·159 ^s	64·34	17·554 ^s	74·98	28·360 ^s	52·76
19·9	13·118 ^s	64·58	17·485 ^s	76·54	28·317 ^s	53·69
29·8	13·041 ^s	64·74	17·383 ^s	77·85	28·242 ^s	54·49
Aug. 8·8	12·932 ^s	64·81	17·253 ^s	78·87	28·139 ^s	55·15
18·8	12·796 ^s	64·78	17·099 ^s	79·58	28·012 ^s	55·66
28·8	12·640 ^s	64·65	16·927 ^s	79·97	27·868 ^s	56·00
Sept. 7·7	12·473 ^s	64·41	16·746 ^s	80·02	27·713 ^s	56·16
17·7	12·304 ^s	64·06	16·563 ^s	79·73	27·557 ^s	56·15
27·7	12·145 ^s	63·64	16·388 ^s	79·10	27·408 ^s	55·94
Oct. 7·6	12·005 ^s	63·15	16·228 ^s	78·11	27·275 ^s	55·54
17·6	11·896 ^s	62·63	16·096 ^s	76·78	27·167 ^s	54·92
27·6	11·826 ^s	62·11	15·998 ^s	75·12	27·094 ^s	54·09
Nov. 6·6	11·803 ^s	61·64	15·942 ^s	73·16	27·061 ^s	53·05
16·5	11·832 ^s	61·26	15·934 ^s	70·92	27·075 ^s	51·79
26·5	11·917 ^s	61·00	15·976 ^s	68·45	27·137 ^s	50·33
Dec. 6·5	12·057 ^s	60·89	16·070 ^s	65·80	27·248 ^s	48·70
16·5	12·250 ^s	60·96	16·214 ^s	63·04	27·407 ^s	46·93
26·4	12·490 ^s	61·21	16·405 ^s	60·25	27·610 ^s	45·06
36·4	12·770 ^s	61·62	16·637 ^s	57·52	27·849 ^s	43·17
Mean Place	10·345	49·08	15·096	79·76	25·850	61·61
Sec δ , Tan δ	1·115	—0·494	1·076	+0·397	1·001	+0·037
<i>a</i> , <i>a'</i>	+3·7	—8·1	+2·6	—7·9	+3·0	—7·9
<i>b</i> , <i>b'</i>	+0·01	+0·9	—0·01	+0·9	0·00	+0·9
Authority and Catalogue No.	B.J.	1002	B.J.	1005	A.N.	1006

† Second transit, May 30

AT UPPER TRANSIT AT GREENWICH.

Name	τ Scorpii		ζ Ophiuchi		24 Scorpii	
	2.91	Bo	2.70	Bo	5.04	Ko
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ₁₆ ^m ₃₁	[°] ₂₈ ['] ₀₄	^h ₁₆ ^m ₃₃	[°] ₁₀ ['] ₂₅	^h ₁₆ ^m ₃₇	[°] ₁₇ ['] ₃₆
Jan. 1.4	33 ^s .133	30 ^s .55	19 ^s .817	49 ^s .60	33 ^s .055	41 ^s .28
11.4	33 ^s .433	30 ^s .95	20 ^s .084	50 ^s .90	33 ^s .328	42 ^s .19
21.4	33 ^s .760	31 ^s .50	20 ^s .376	52 ^s .21	33 ^s .628	43 ^s .16
31.3	34 ^s .106	32 ^s .18	20 ^s .686	53 ^s .50	33 ^s .946	44 ^s .17
Feb. 10.3	34 ^s .462	32 ^s .94	21 ^s .006	54 ^s .70	34 ^s .275	45 ^s .16
20.3	34 ^s .821	33 ^s .76	21 ^s .328	55 ^s .77	34 ^s .608	46 ^s .10
Mar. 2.2	35 ^s .178	34 ^s .61	21 ^s .648	56 ^s .67	34 ^s .939	46 ^s .96
12.2	35 ^s .526	35 ^s .45	21 ^s .960	57 ^s .39	35 ^s .263	47 ^s .70
22.2	35 ^s .861	36 ^s .27	22 ^s .261	57 ^s .90	35 ^s .575	48 ^s .31
Apr. 1.2	36 ^s .179	37 ^s .06	22 ^s .546	58 ^s .20	35 ^s .873	48 ^s .78
11.1	36 ^s .478	37 ^s .81	22 ^s .813	58 ^s .30	36 ^s .153	49 ^s .12
21.1	36 ^s .754	38 ^s .52	23 ^s .060	58 ^s .23	36 ^s .413	49 ^s .34
May 1.1	37 ^s .005	39 ^s .18	23 ^s .284	58 ^s .00	36 ^s .650	49 ^s .46
11.1	37 ^s .228	39 ^s .81	23 ^s .483	57 ^s .66	36 ^s .862	49 ^s .49
21.0	37 ^s .420	40 ^s .41	23 ^s .654	57 ^s .23	37 ^s .045	49 ^s .46
31.0	37 ^s .578†	40 ^s .98	23 ^s .795†	56 ^s .75	37 ^s .197	49 ^s .38
June 9.9	37 ^s .700	41 ^s .51	23 ^s .904	56 ^s .24	37 ^s .315	49 ^s .28
19.9	37 ^s .783	42 ^s .01	23 ^s .978	55 ^s .72	37 ^s .398	49 ^s .16
29.9	37 ^s .826	42 ^s .47	24 ^s .016	55 ^s .21	37 ^s .444	49 ^s .04
July 9.9	37 ^s .829	42 ^s .87	24 ^s .019	54 ^s .73	37 ^s .452	48 ^s .91
19.9	37 ^s .791	43 ^s .20	23 ^s .987	54 ^s .29	37 ^s .423	48 ^s .78
29.8	37 ^s .717	43 ^s .44	23 ^s .921	53 ^s .89	37 ^s .359	48 ^s .64
Aug. 8.8	37 ^s .609	43 ^s .58	23 ^s .824	53 ^s .53	37 ^s .262	48 ^s .49
18.8	37 ^s .473	43 ^s .61	23 ^s .702	53 ^s .22	37 ^s .139	48 ^s .33
28.8	37 ^s .316	43 ^s .52	23 ^s .561	52 ^s .96	36 ^s .996	48 ^s .15
Sept. 7.7	37 ^s .146	43 ^s .32	23 ^s .408	52 ^s .76	36 ^s .839	47 ^s .95
17.7	36 ^s .973	42 ^s .99	23 ^s .252	52 ^s .61	36 ^s .679	47 ^s .74
27.7	36 ^s .809	42 ^s .56	23 ^s .103	52 ^s .54	36 ^s .525	47 ^s .53
Oct. 7.6	36 ^s .663	42 ^s .04	22 ^s .969	52 ^s .55	36 ^s .387	47 ^s .33
17.6	36 ^s .547	41 ^s .48	22 ^s .862	52 ^s .66	36 ^s .275	47 ^s .17
27.6	36 ^s .470	40 ^s .90	22 ^s .790	52 ^s .89	36 ^s .199	47 ^s .08
Nov. 6.6	36 ^s .441	40 ^s .34	22 ^s .759	53 ^s .27	36 ^s .166	47 ^s .08
16.5	36 ^s .464	39 ^s .86	22 ^s .775	53 ^s .80	36 ^s .181	47 ^s .19
26.5	36 ^s .543	39 ^s .48	22 ^s .842	54 ^s .49	36 ^s .248	47 ^s .44
Dec. 6.5	36 ^s .678	39 ^s .24	22 ^s .959	55 ^s .35	36 ^s .367	47 ^s .84
16.5	36 ^s .867	39 ^s .16	23 ^s .124	56 ^s .36	36 ^s .536	48 ^s .39
26.4	37 ^s .104	39 ^s .26	23 ^s .333	57 ^s .50	36 ^s .749	49 ^s .09
36.4	37 ^s .382	39 ^s .54	23 ^s .581	58 ^s .74	37 ^s .003	49 ^s .91
Mean Place	34.946	27.57	21.383	43.36	34.713	36.16
Sec δ, Tan δ	1.133	-0.533	1.017	-0.184	1.049	-0.317
a, a'	+3.7	-7.5	+3.3	-7.4	+3.5	-7.1
b, b'	+0.01	+0.9	0.00	+0.9	+0.01	+0.9
Authority and Catalogue No.	A.N.	1008	B.J.	1013	A.N.	1016

† First transit, May 31.

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name	ζ Herculis (<i>Brighter Star</i>)		η Herculis		α Trianguli Australis	
	3.00	Go	3.61	Ko	1.88	K2
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ₁₆ ^m ₃₈	[°] ₊₃₁ ['] ₄₃	^h ₁₆ ^m ₄₀	[°] ₊₃₉ ['] ₀₂	^h ₁₆ ^m ₄₁	[°] ₋₆₈ ['] ₅₄
Jan. 1.4	39.465 ^s ₂₄₆	22.83 ["] ₂₉₈	30.088 ^s ₂₅₁	54.74 ["] ₃₁₇	16.04 ^s ₆₀	11.05 ["] ₁₆₄
11.4	39.711 ^s ₂₈₁	19.85 ["] ₂₇₁	30.339 ^s ₂₉₁	51.57 ["] ₂₈₈	16.64 ^s ₆₈	09.41 ["] ₁₂₇
21.4	39.992 ^s ₃₀₇	17.14 ["] ₂₃₇	30.630 ^s ₃₂₂	48.69 ["] ₂₄₉	17.32 ^s ₇₄	08.14 ["] ₈₇
31.3	40.299 ^s ₃₂₄	14.77 ["] ₁₉₂	30.952 ^s ₃₄₂	46.20 ["] ₂₀₂	18.06 ^s ₇₇	07.27 ["] ₄₅
Feb. 10.3	40.623 ^s ₃₃₄	12.85 ["] ₁₄₄	31.294 ^s ₃₅₄	44.18 ["] ₁₄₈	18.83 ^s ₈₀	06.82 ["] ₃
20.3	40.957 ^s ₃₃₅	11.41 ["] ₈₉	31.648 ^s ₃₅₆	42.70 ["] ₈₉	19.63 ^s ₈₀	06.79 ["] ₃₇
Mar. 2.3	41.292 ^s ₃₂₈	10.52 ["] ₃₂	32.004 ^s ₃₅₁	41.81 ["] ₂₈	20.43 ^s ₇₉	07.16 ["] ₇₆
12.2	41.620 ^s ₃₁₇	10.20 ["] ₂₅	32.355 ^s ₃₃₈	41.53 ["] ₃₃	21.22 ^s ₇₆	07.92 ["] ₁₁₃
22.2	41.937 ^s ₂₉₈	10.45 ["] ₇₈	32.693 ^s ₃₁₉	41.86 ["] ₉₁	21.98 ^s ₇₃	09.05 ["] ₁₄₆
Apr. 1.2	42.235 ^s ₂₇₆	11.23 ["] ₁₂₈	33.012 ^s ₂₉₃	42.77 ["] ₁₄₃	22.71 ^s ₆₉	10.51 ["] ₁₇₆
11.1	42.511 ^s ₂₄₈	12.51 ["] ₁₇₁	33.305 ^s ₂₆₃	44.20 ["] ₁₈₈	23.40 ^s ₆₃	12.27 ["] ₂₀₂
21.1	42.759 ^s ₂₁₉	14.22 ["] ₂₀₄	33.568 ^s ₂₃₀	46.08 ["] ₂₂₆	24.03 ^s ₅₆	14.29 ["] ₂₃₅
May 1.1	42.978 ^s ₁₈₆	16.26 ["] ₂₃₂	33.798 ^s ₁₉₂	48.34 ["] ₂₅₃	24.59 ^s ₄₉	16.54 ["] ₂₄₂
11.1	43.164 ^s ₁₅₁	18.58 ["] ₂₄₉	33.990 ^s ₁₅₂	50.87 ["] ₂₇₃	25.08 ^s ₄₁	18.96 ["] ₂₅₅
21.0	43.315 ^s ₁₁₁	21.07 ["] ₂₅₉	34.142 ^s ₁₀₉	53.60 ["] ₂₈₁	25.49 ^s ₃₁	21.51 ["] ₂₆₂
31.0	² 43.426 ^s ₇₃	23.66 ["] ₂₅₇	² 34.251 ^s ₆₆	56.41 ["] ₂₈₂	² 25.80 ^s ₂₂	24.13 ["] ₂₆₄
June 9.9	43.499 ^s ₃₂	26.23 ["] ₂₅₂	34.317 ^s ₂₁	59.23 ["] ₂₇₃	26.02 ^s ₁₂	26.77 ["] ₂₆₀
19.9	43.531 ^s ₈	28.75 ["] ₂₃₈	34.338 ^s ₂₄	61.96 ["] ₂₅₆	26.14 ^s ₄	29.37 ["] ₂₄₈
29.9	43.523 ^s ₄₈	31.13 ["] ₂₁₈	34.314 ^s ₆₇	64.52 ["] ₂₃₄	26.18 ^s ₈	31.85 ["] ₂₃₂
July 9.9	43.475 ^s ₈₇	33.31 ["] ₁₉₁	34.247 ^s ₁₀₉	66.86 ["] ₂₀₅	26.10 ^s ₁₈	34.17 ["] ₂₀₇
19.9	43.388 ^s ₁₂₂	35.22 ["] ₁₆₁	34.138 ^s ₁₄₇	68.91 ["] ₁₇₂	25.92 ^s ₂₇	36.24 ["] ₁₇₇
29.8	43.266 ^s ₁₅₄	36.83 ["] ₁₂₆	33.991 ^s ₁₈₀	70.63 ["] ₁₃₄	25.65 ^s ₃₅	38.01 ["] ₁₄₂
Aug. 8.8	43.112 ^s ₁₈₀	38.09 ["] ₈₉	33.811 ^s ₂₀₈	71.97 ["] ₉₄	25.30 ^s ₄₁	39.43 ["] ₁₀₀
18.8	42.932 ^s ₂₀₀	38.98 ["] ₅₀	33.603 ^s ₂₂₉	72.91 ["] ₅₁	24.80 ^s ₄₆	40.43 ["] ₅₆
28.8	42.732 ^s ₂₁₀	39.48 ["] ₁₁	33.374 ^s ₂₄₁	73.42 ["] ₆	24.43 ^s ₄₉	40.99 ["] ₈
Sept. 7.7	42.522 ^s ₂₁₅	39.59 ["] ₃₁	33.133 ^s ₂₄₅	73.48 ["] ₃₉	23.94 ^s ₄₉	41.07 ["] ₄₁
17.7	42.307 ^s ₂₀₉	39.28 ["] ₇₃	32.888 ^s ₂₃₈	73.09 ["] ₈₅	23.45 ^s ₄₈	40.66 ["] ₈₈
27.7	42.098 ^s ₁₉₂	38.55 ["] ₁₁₄	32.650 ^s ₂₂₁	72.24 ["] ₁₂₉	22.97 ^s ₄₃	39.78 ["] ₁₃₂
Oct. 7.7	41.906 ^s ₁₆₇	37.41 ["] ₁₅₅	32.429 ^s ₁₉₄	70.95 ["] ₁₇₃	22.54 ^s ₃₆	38.46 ["] ₁₇₂
17.6	41.739 ^s ₁₃₀	35.86 ["] ₁₉₂	32.235 ^s ₁₅₇	69.22 ["] ₂₁₃	22.18 ^s ₂₈	36.74 ["] ₂₀₇
27.6	41.609 ^s ₈₉	33.94 ["] ₂₂₇	32.078 ^s ₁₁₂	67.09 ["] ₂₅₀	21.90 ^s ₁₇	34.67 ["] ₂₃₁
Nov. 6.6	41.520 ^s ₄₀	31.67 ["] ₂₅₈	31.966 ^s ₅₉	64.59 ["] ₂₈₂	21.73 ^s ₅	32.36 ["] ₂₄₈
16.5	41.480 ^s ₁₄	29.09 ["] ₂₈₃	31.907 ^s ₃	61.77 ["] ₃₀₉	21.68 ^s ₇	29.88 ["] ₂₅₅
26.5	41.494 ^s ₆₉	26.26 ["] ₃₀₂	31.904 ^s ₅₆	58.68 ["] ₃₂₈	21.75 ^s ₂₁	27.33 ["] ₂₅₁
Dec. 6.5	41.563 ^s ₁₂₄	23.24 ["] ₃₁₂	31.960 ^s ₁₁₆	55.40 ["] ₃₃₈	21.96 ^s ₃₃	24.82 ["] ₂₃₈
16.5	41.687 ^s ₁₇₄	20.12 ["] ₃₁₄	32.076 ^s ₁₇₂	52.02 ["] ₃₃₇	22.29 ^s ₄₄	22.44 ["] ₂₁₇
26.4	41.861 ^s ₂₂₀	16.98 ["] ₃₀₆	32.248 ^s ₂₂₃	48.65 ["] ₃₂₆	22.73 ^s ₅₅	20.27 ["] ₁₈₇
36.4	42.081 ^s	13.92 ["]	32.471 ^s	45.39 ["]	23.28 ^s	18.40 ["]
Mean Place	40.982	36.40	31.684	68.99	20.484	12.83
Sec δ , Tan δ	1.176	+0.618	1.288	+0.811	2.778	-2.592
a, a'	+2.3	-7.0	+2.1	-6.8	+6.3	-6.7
b, b'	-0.01	+0.9	-0.02	+0.9	+0.06	+0.9
Authority and Catalogue No.	N.A.	1017	B.J.	1018	B.J.	1019

No. 1017. The reductions from $a.g.$ to brighter star vary during the year from $-0^s.000$ to $-0^s.21$ to $+0^s.004$, $-0^s.16$. The mean place is that of $a.g.$

AT UPPER TRANSIT AT GREENWICH.

Name Mag. Spect.	ε Scorpii		20 Ophiuchi		μ ¹ Scorpii	
	2.36	Ko	4.73	F5	3.09	B3p
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 16 ^m 45	[°] —34 ['] 10	^h 16 ^m 45	[°] —10 ['] 39	^h 16 ^m 47	[°] —37 ['] 55
Jan. 1.4	39.432 ^s 303	13.00 ["]	59.210 ^s 259	51.39 ["] 124	09.400 ^s 315	52.47 ["] 23
11.4	39.735 ^s 335	12.98 ["] 16	59.469 ^s 284	52.63 ["] 125	09.715 ^s 348	52.24 ["] 4
21.4	40.070 ^s 357	13.14 ["] 33	59.753 ^s 303	53.88 ["] 121	10.063 ^s 372	52.20 ["] 16
31.3	40.427 ^s 372	13.47 ["] 47	60.056 ^s 315	55.09 ["] 113	10.435 ^s 388	52.36 ["] 34
Feb. 10.3	40.799 ^s 377	13.94 ["] 59	60.371 ^s 320	56.22 ["] 101	10.823 ^s 394	52.70 ["] 48
20.3	41.176 ^s 377	14.53 ["] 67	60.691 ^s 320	57.23 ["] 84	11.217 ^s 395	53.18 ["] 61
Mar. 2.3	41.553 ^s 371	15.20 ["] 74	61.011 ^s 314	58.07 ["] 66	11.612 ^s 389	53.79 ["] 72
12.2	41.924 ^s 359	15.94 ["] 79	61.325 ^s 305	58.73 ["] 47	12.001 ^s 377	54.51 ["] 80
22.2	42.283 ^s 344	16.73 ["] 81	61.630 ^s 292	59.20 ["] 25	12.378 ^s 363	55.31 ["] 87
Apr. 1.2	42.627 ^s 326	17.54 ["] 83	61.922 ^s 275	59.45 ["] 6	12.741 ^s 344	56.18 ["] 93
11.1	42.953 ^s 303	18.37 ["] 85	62.197 ^s 256	59.51 ["] 11	13.085 ^s 319	57.11 ["] 97
21.1	43.256 ^s 279	19.22 ["] 85	62.453 ^s 235	59.40 ["] 25	13.404 ^s 293	58.08 ["] 101
May 1.1	43.535 ^s 249	20.07 ["] 87	62.688 ^s 210	59.15 ["] 38	13.697 ^s 263	59.09 ["] 105
11.1	43.784 ^s 217	20.94 ["] 87	62.898 ^s 183	58.77 ["] 46	13.960 ^s 229	60.14 ["] 106
21.0	44.001 ^s 182	21.81 ["] 87	63.081 ^s 153	58.31 ["] 51	14.189 ^s 191	61.20 ["] 107
31.0	44.183 ^s 142	22.68 ["] 86	63.234 ^s 121	57.80 ["] 53	14.380 ^s 149	62.27 ["] 107
June 9.9	44.325 ^s 101	23.54 ["] 83	63.355 ^s 86	57.27 ["] 52	14.529 ^s 107	63.34 ["] 104
19.9	44.426 ^s 57	24.37 ["] 79	63.441 ^s 50	56.75 ["] 52	14.636 ^s 61	64.38 ["] 99
29.9	44.483 ^s 12	25.16 ["] 73	63.491 ^s 12	56.23 ["] 49	14.697 ^s 13	65.37 ["] 92
July 9.9	44.495 ^s 31	25.89 ["] 64	63.503 ^s 23	55.74 ["] 45	14.710 ^s 33	66.29 ["] 81
19.9	44.464 ^s 73	26.53 ["] 54	63.480 ^s 59	55.29 ["] 39	14.677 ^s 76	67.10 ["] 69
29.8	44.391 ^s 111	27.07 ["] 40	63.421 ^s 91	54.90 ["] 34	14.601 ^s 116	67.79 ["] 52
Aug. 8.8	44.280 ^s 143	27.47 ["] 25	63.330 ^s 117	54.56 ["] 30	14.485 ^s 151	68.31 ["] 34
18.8	44.137 ^s 169	27.72 ["] 8	63.213 ^s 139	54.26 ["] 25	14.334 ^s 176	68.65 ["] 14
28.8	43.968 ^s 185	27.80 ["] 10	63.074 ^s 153	54.01 ["] 19	14.158 ^s 193	68.79 ["] 7
Sept. 7.7	43.783 ^s 189	27.70 ["] 28	62.921 ^s 157	53.82 ["] 13	13.965 ^s 199	68.72 ["] 29
17.7	43.594 ^s 184	27.42 ["] 45	62.764 ^s 153	53.69 ["] 7	13.766 ^s 193	68.43 ["] 50
27.7	43.410 ^s 166	26.97 ["] 60	62.611 ^s 139	53.62 ["] 1	13.573 ^s 175	67.93 ["] 69
Oct. 7.7	43.244 ^s 137	26.37 ["] 72	62.472 ^s 115	53.63 ["] 11	13.398 ^s 144	67.24 ["] 84
17.6	43.107 ^s 97	25.65 ["] 80	62.357 ^s 82	53.74 ["] 23	13.254 ^s 103	66.40 ["] 95
27.6	43.010 ^s 48	24.85 ["] 83	62.275 ^s 41	53.97 ["] 36	13.151 ^s 53	65.45 ["] 102
Nov. 6.6	42.962 ^s 6	24.02 ["] 82	62.234 ^s 5	54.33 ["] 50	13.098 ^s 5	64.43 ["] 103
16.5	42.968 ^s 65	23.20 ["] 76	62.239 ^s 54	54.83 ["] 65	13.103 ^s 66	63.40 ["] 98
26.5	43.033 ^s 125	22.44 ["] 65	62.293 ^s 105	55.48 ["] 81	13.169 ^s 128	62.42 ["] 89
Dec. 6.5	43.158 ^s 182	21.79 ["] 51	62.398 ^s 153	56.29 ["] 96	13.297 ^s 187	61.53 ["] 75
16.5	43.340 ^s 234	21.28 ["] 34	62.551 ^s 198	57.25 ["] 107	13.484 ^s 243	60.78 ["] 58
26.4	43.574 ^s 279	20.94 ["] 16	62.749 ^s 237	58.32 ["] 117	13.727 ^s 290	60.20 ["] 38
36.4	43.853 ^s	20.78 ["]	62.986 ^s	59.49 ["]	14.017 ^s	59.82 ["]
Mean Place Sec δ, Tan δ	41.410 1.209	10.17 —0.679	60.811 1.018	44.58 —0.188	11.483 1.268	50.10 —0.779
a, a'	+3.9	—6.4	+3.3	—6.4	+4.1	—6.3
b, b'	+0.01	+0.9	0.00	+0.9	+0.02	+1.0
Authority and Catalogue No.	B.J.	1023	A.N.	1024	A.N.	1026

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name	ζ Aræ		κ Ophiuchi		30 Ophiuchi	
	3.06	K5	3.42	Ko	5.00	Ko
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ₁₆ ^m ₅₂	[°] _{—55} ['] ₅₂	^h ₁₆ ^m ₅₄	[°] ₊₉ ['] ₂₈	^h ₁₆ ^m ₅₇	[°] _{—4} ['] ₀₇
Jan. 1.4	^s _{51.228} 405	["] _{59.56} 119	^s _{22.491} 232	["] _{41.77} 218	^s _{23.528} 241	["] _{21.50} 151
11.4	^s _{51.633} 455	["] _{58.37} 90	^s _{22.723} 262	["] _{39.59} 206	^s _{23.769} 268	["] _{23.01} 149
21.4	^s _{52.088} 492	["] _{57.47} 59	^s _{22.985} 284	["] _{37.53} 188	^s _{24.037} 289	["] _{24.50} 141
31.3	^s _{52.580} 518	["] _{56.88} 26	^s _{23.269} 299	["] _{35.65} 162	^s _{24.326} 303	["] _{25.91} 127
Feb. 10.3	^s _{53.098} 531	["] _{56.62} 4	^s _{23.568} 306	["] _{34.03} 131	^s _{24.629} 312	["] _{27.18} 108
20.3	^s _{53.629} 535	["] _{56.66} 34	^s _{23.874} 308	["] _{32.72} 94	^s _{24.941} 312	["] _{28.26} 85
Mar. 2.3	^s _{54.164} 529	["] _{57.00} 62	^s _{24.182} 304	["] _{31.78} 55	^s _{25.253} 308	["] _{29.11} 60
12.2	^s _{54.693} 517	["] _{57.62} 89	^s _{24.486} 295	["] _{31.23} 16	^s _{25.561} 301	["] _{29.71} 32
22.2	^s _{55.210} 497	["] _{58.51} 113	^s _{24.781} 283	["] _{31.07} 24	^s _{25.862} 289	["] _{30.03} 6
Apr. 1.2	^s _{55.707} 471	["] _{59.64} 132	^s _{25.064} 267	["] _{31.31} 60	^s _{26.151} 275	["] _{30.09} 19
11.2	^s _{56.178} 438	["] _{60.96} 152	^s _{25.331} 248	["] _{31.91} 92	^s _{26.426} 256	["] _{29.90} 42
21.1	^s _{56.616} 400	["] _{62.48} 169	^s _{25.579} 226	["] _{32.83} 120	^s _{26.682} 237	["] _{29.48} 60
May 1.1	^s _{57.016} 357	["] _{64.17} 182	^s _{25.805} 202	["] _{34.03} 140	^s _{26.919} 213	["] _{28.88} 75
11.1	^s _{57.373} 307	["] _{65.99} 193	^s _{26.007} 174	["] _{35.43} 155	^s _{27.132} 187	["] _{28.13} 86
21.0	^s _{57.680} 253	["] _{67.92} 199	^s _{26.181} 143	["] _{36.98} 164	^s _{27.319} 157	["] _{27.27} 92
31.0	^s _{57.933} 193	["] _{69.91} 201	^s _{26.324} 111	["] _{38.62} 167	^s _{27.476} 125	["] _{26.35} 94
June 9.9	^s _{58.126} 130	["] _{71.92} 199	^s _{26.435} 76	["] _{40.29} 164	^s _{27.601} 91	["] _{25.41} 94
19.9	^s _{58.256} 65	["] _{73.91} 193	^s _{26.511} 38	["] _{41.93} 157	^s _{27.692} 54	["] _{24.47} 90
29.9	^s _{58.321} 1	["] _{75.84} 181	^s _{26.549} 3	["] _{43.50} 146	^s _{27.746} 18	["] _{23.57} 83
July 9.9	^s _{58.320} 66	["] _{77.65} 163	^s _{26.552} 33	["] _{44.96} 131	^s _{27.764} 19	["] _{22.74} 76
19.9	^s _{58.254} 128	["] _{79.28} 141	^s _{26.519} 68	["] _{46.27} 113	^s _{27.745} 54	["] _{21.98} 66
29.9	^s _{58.126} 184	["] _{80.69} 114	^s _{26.451} 99	["] _{47.40} 93	^s _{27.691} 87	["] _{21.32} 55
Aug. 8.8	^s _{57.942} 231	["] _{81.83} 83	^s _{26.352} 127	["] _{48.33} 71	^s _{27.604} 114	["] _{20.77} 45
18.8	^s _{57.711} 267	["] _{82.66} 48	^s _{26.225} 148	["] _{49.04} 49	^s _{27.490} 138	["] _{20.32} 33
28.8	^s _{57.444} 291	["] _{83.14} 11	^s _{26.077} 162	["] _{49.53} 24	^s _{27.352} 152	["] _{19.99} 21
Sept. 7.7	^s _{57.153} 299	["] _{83.25} 28	^s _{25.915} 169	["] _{49.77} 1	^s _{27.200} 159	["] _{19.78} 9
17.7	^s _{56.854} 292	["] _{82.97} 65	^s _{25.746} 165	["] _{49.76} 26	^s _{27.041} 156	["] _{19.69} 4
27.7	^s _{56.562} 266	["] _{82.32} 101	^s _{25.581} 153	["] _{49.50} 52	^s _{26.885} 145	["] _{19.73} 18
Oct. 7.7	^s _{56.296} 226	["] _{81.31} 132	^s _{25.428} 131	["] _{48.98} 78	^s _{26.740} 122	["] _{19.91} 34
17.6	^s _{56.070} 170	["] _{79.99} 159	^s _{25.297} 101	["] _{48.20} 104	^s _{26.618} 91	["] _{20.25} 49
27.6	^s _{55.900} 103	["] _{78.40} 179	^s _{25.196} 62	["] _{47.16} 130	^s _{26.527} 54	["] _{20.74} 66
Nov. 6.6	^s _{55.797} 25	["] _{76.61} 191	^s _{25.134} 19	["] _{45.86} 155	^s _{26.473} 9	["] _{21.40} 84
16.6	^s _{55.772} 58	["] _{74.70} 195	^s _{25.115} 29	["] _{44.31} 176	^s _{26.464} 39	["] _{22.24} 100
26.5	^s _{55.830} 143	["] _{72.75} 192	^s _{25.144} 79	["] _{42.55} 195	^s _{26.503} 88	["] _{23.24} 118
Dec. 6.5	^s _{55.973} 225	["] _{70.83} 181	^s _{25.223} 126	["] _{40.60} 209	^s _{26.591} 135	["] _{24.42} 130
16.5	^s _{56.198} 302	["] _{69.02} 162	^s _{25.349} 171	["] _{38.51} 217	^s _{26.726} 180	["] _{25.72} 141
26.4	^s _{56.500} 370	["] _{67.40} 138	^s _{25.520} 211	["] _{36.34} 218	^s _{26.906} 220	["] _{27.13} 149
36.4	^s _{56.870}	["] _{66.02}	^s _{25.731}	["] _{34.16}	^s _{27.126}	["] _{28.62}
Mean Place	54.151	59.04	24.005	51.79	25.104	13.47
Sec δ, Tan δ	1.783	—1.476	1.014	+0.167	1.003	—0.072
a, a'	+5.0	—5.8	+2.9	—5.7	+3.2	—5.4
b, b'	+0.03	+1.0	0.00	+1.0	0.00	+1.0
Authority and Catalogue No.	B.J.	1031	B.J.	1034	N.A.	1035

APPARENT PLACES OF STARS, 1931.

469

AT UPPER TRANSIT AT GREENWICH.

Name	ε Herculis		η Ophiuchi <i>m.</i>		η Scorpii	
	3·92	Λo	2·63	A2	3·44	F2
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ₁₆ ^m ₅₇	[°] ₊₃₁ ['] ₀₁	^h ₁₇ ^m ₀₆	[°] ₋₁₅ ['] ₃₈	^h ₁₇ ^m ₀₇	[°] ₋₄₃ ['] ₀₈
Jan. 1·4	^s _{37·242} ²²⁷	^s _{24·17} ²⁹⁹	^s _{23·405} ²⁴⁷	^s _{33·93} ⁸⁶	^s _{10·071} ³¹⁴	^s _{62·77} ⁶⁷
11·4	_{37·469} ²⁶⁵	_{21·18} ²⁷⁶	_{23·652} ²⁷⁷	_{34·79} ⁹⁰	_{10·385} ³⁵⁴	_{62·10} ⁴⁶
21·4	_{37·734} ²⁹³	_{18·42} ²⁴⁴	_{23·929} ³⁰⁰	_{35·69} ⁹¹	_{10·739} ³⁸⁴	_{61·64} ²⁵
31·4	_{38·027} ³¹⁴	_{15·98} ²⁰³	_{24·229} ³¹⁴	_{36·60} ⁸⁸	_{11·123} ⁴⁰⁴	_{61·39} ⁵
Feb. 10·3	_{38·341} ³²⁶	_{13·95} ¹⁵⁵	_{24·543} ³²³	_{37·48} ⁸⁰	_{11·527} ⁴¹⁷	_{61·34} ¹⁴
20·3	_{38·667} ³³¹	_{12·40} ¹⁰¹	_{24·866} ³²⁵	_{38·28} ⁶⁹	_{11·944} ⁴²²	_{61·48} ³²
Mar. 2·3	_{38·998} ³²⁹	_{11·39} ⁴⁶	_{25·191} ³²³	_{38·97} ⁵⁶	_{12·366} ⁴¹⁹	_{61·80} ⁴⁸
12·2	_{39·327} ³²⁰	_{10·93} ¹¹	_{25·514} ³¹⁷	_{39·53} ⁴⁰	_{12·785} ⁴¹²	_{62·28} ⁶²
22·2	_{39·647} ³⁰⁶	_{11·04} ⁶⁶	_{25·831} ³⁰⁶	_{39·93} ²⁵	_{13·197} ⁴⁰⁰	_{62·90} ⁷⁵
Apr. 1·2	_{39·953} ²⁸⁷	_{11·70} ¹¹⁶	_{26·137} ²⁹²	_{40·18} ¹¹	_{13·597} ³⁸²	_{63·65} ⁸⁶
11·2	_{40·240} ²⁶³	_{12·86} ¹⁶⁰	_{26·429} ²⁷⁶	_{40·29} ²	_{13·979} ³⁶⁰	_{64·51} ⁹⁷
21·1	_{40·503} ²³⁵	_{14·46} ¹⁹⁸	_{26·705} ²⁵⁷	_{40·27} ¹³	_{14·339} ³³⁴	_{65·48} ¹⁰⁶
May 1·1	_{40·738} ²⁰⁵	_{16·44} ²²⁶	_{26·962} ²³³	_{40·14} ²²	_{14·673} ³⁰³	_{66·54} ¹¹⁵
11·1	_{40·943} ¹⁷¹	_{18·70} ²⁴⁷	_{27·195} ²⁰⁸	_{39·92} ²⁷	_{14·976} ²⁶⁸	_{67·69} ¹²¹
21·1	_{41·114} ¹³³	_{21·17} ²⁵⁸	_{27·403} ¹⁷⁷	_{39·65} ³¹	_{15·244} ²²⁸	_{68·90} ¹²⁷
31·0	_{41·247} ⁹⁴	_{23·75} ²⁶²	_{27·580} ¹⁴⁵	_{39·34} ³¹	_{15·472} ¹⁸³	_{70·17} ¹³⁰
June 9·9	_{41·341} ⁵³	_{26·37} ²⁵⁷	_{27·725} ¹⁰⁹	_{39·03} ³¹	_{15·655} ¹³⁵	_{71·47} ¹³⁰
19·9	_{41·394} ¹¹	_{28·94} ²⁴⁶	_{27·834} ⁷¹	_{38·72} ³⁰	_{15·790} ⁸⁵	_{72·77} ¹²⁷
29·9	_{41·405} ²⁹	_{31·40} ²²⁶	_{27·905} ³²	_{38·42} ²⁶	_{15·875} ³⁴	_{74·04} ¹²²
July 9·9	_{41·376} ⁷⁰	_{33·66} ²⁰²	_{27·937} ⁷	_{38·16} ²³	_{15·909} ¹⁹	_{75·26} ¹¹²
19·9	_{41·306} ¹⁰⁷	_{35·68} ¹⁷³	_{27·930} ⁴⁶	_{37·93} ²¹	_{15·890} ⁶⁹	_{76·38} ⁹⁸
29·9	_{41·199} ¹⁴²	_{37·41} ¹⁴¹	_{27·884} ⁸⁰	_{37·72} ¹⁸	_{15·821} ¹¹⁵	_{77·36} ⁸²
Aug. 8·8	_{41·057} ¹⁷¹	_{38·82} ¹⁰⁵	_{27·804} ¹¹¹	_{37·54} ¹⁶	_{15·706} ¹⁵⁵	_{78·18} ⁶¹
18·8	_{40·886} ¹⁹⁴	_{39·87} ⁶⁷	_{27·693} ¹³⁷	_{37·38} ¹⁵	_{15·551} ¹⁸⁶	_{78·79} ³⁸
28·8	_{40·692} ²⁰⁹	_{40·54} ²⁷	_{27·556} ¹⁵³	_{37·23} ¹⁴	_{15·365} ²⁰⁹	_{79·17} ¹³
Sept. 7·8	_{40·483} ²¹⁵	_{40·81} ¹⁴	_{27·403} ¹⁶²	_{37·09} ¹³	_{15·156} ²²⁰	_{79·30} ¹³
17·7	_{40·268} ²¹²	_{40·67} ⁵⁶	_{27·241} ¹⁶¹	_{36·96} ¹¹	_{14·936} ²¹⁸	_{79·17} ³⁹
27·7	_{40·056} ²⁰⁰	_{40·11} ⁹⁶	_{27·080} ¹⁵⁰	_{36·85} ⁹	_{14·718} ²⁰²	_{78·78} ⁶⁵
Oct. 7·7	_{39·856} ¹⁷⁶	_{39·15} ¹³⁷	_{26·930} ¹²⁷	_{36·76} ⁵	_{14·516} ¹⁷⁴	_{78·13} ⁸⁶
17·6	_{39·680} ¹⁴⁴	_{37·78} ¹⁷⁶	_{26·803} ⁹⁷	_{36·71} ¹	_{14·342} ¹³³	_{77·27} ¹⁰⁵
27·6	_{39·536} ¹⁰⁴	_{36·02} ²¹²	_{26·706} ⁵⁷	_{36·72} ⁹	_{14·209} ⁸¹	_{76·22} ¹¹⁸
Nov. 6·6	_{39·432} ⁵⁷	_{33·90} ²⁴⁴	_{26·649} ¹²	_{36·81} ²⁰	_{14·128} ²²	_{75·04} ¹²⁶
16·6	_{39·375} ⁵	_{31·46} ²⁷²	_{26·637} ³⁸	_{37·01} ³¹	_{14·106} ⁴¹	_{73·78} ¹²⁷
26·5	_{39·370} ⁴⁸	_{28·74} ²⁹³	_{26·675} ⁸⁹	_{37·32} ⁴³	_{14·147} ¹⁰⁸	_{72·51} ¹²³
Dec. 6·5	_{39·418} ¹⁰³	_{25·81} ³⁰⁶	_{26·764} ¹³⁸	_{37·75} ⁵⁷	_{14·255} ¹⁷²	_{71·28} ¹¹³
16·5	_{39·521} ¹⁵⁵	_{22·75} ³¹⁰	_{26·902} ¹⁸⁵	_{38·32} ⁶⁹	_{14·427} ²³³	_{70·15} ¹⁰⁰
26·5	_{39·676} ²⁰¹	_{19·65} ³⁰⁵	_{27·087} ²²⁵	_{39·01} ⁷⁸	_{14·660} ²⁸⁶	_{69·15} ⁸¹
36·4	_{39·877}	_{16·60}	_{27·312}	_{39·79}	_{14·946}	_{68·34}
Mean Place	38·834	37·04	25·100	27·30	12·354	59·65
Sec δ, Tan δ	1·167	+0·601	1·038	-0·280	1·371	-0·937
<i>a</i> , <i>a'</i>	+2·3	-5·4	+3·4	-4·6	+4·3	-4·6
<i>b</i> , <i>b'</i>	-0·01	+1·0	0·00	+1·0	+0·01	+1·0
Authority and Catalogue No.	B. J.	1036	B. J.	1040	A. N.	1041

† Second transit, June 9.

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name	ζ Draconis		α ¹ Herculis		δ Herculis	
	3·22	B ₅	Var.	Mb	3·16	A ₂
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 17 ^m 08	[°] +65 ['] 47	^h 17 ^m 11	[°] +14 ['] 27	^h 17 ^m 12	[°] +24 ['] 54
Jan. 1·4	32·06	43·25	28·399	53·39	10·116	57·86
11·4	32·33	39·72	28·615	51·02	10·329	55·07
21·4	32·70	36·50	28·863	48·78	10·577	52·45
31·4	33·14	33·68	29·136	46·75	10·854	50·11
Feb. 10·3	33·65	31·38	29·427	45·00	11·151	48·12
20·3	34·20	29·68	29·729	43·60	11·461	46·56
Mar. 2·3	34·77	28·62	30·036	42·61	11·778	45·49
12·2	35·35	28·25	30·342	42·05	12·095	44·93
22·2	35·93	28·56	30·643	41·93	12·406	44·89
Apr. 1·2	36·48	29·52	30·934	42·25	12·707	45·37
11·2	36·99	31·09	31·211	42·97	12·993	46·33
21·1	37·44	33·19	31·471	44·06	13·259	47·71
May 1·1	37·82	35·74	31·710	45·45	13·502	49·46
11·1	38·13	38·64	31·924	47·09	13·717	51·50
21·1	38·35	41·77	32·111	48·90	13·902	53·74
31·0	38·49	45·05	32·268	50·83	14·053	56·11
June 10·0	38·54	48·36	32·391	52·79	14·168	58·53
19·9	38·50	51·60	32·478	54·74	14·244	60·93
29·9	38·38	54·70	32·527	56·62	14·280	63·23
July 9·9	38·17	57·55	32·538	58·36	14·275	65·38
19·9	37·88	60·10	32·511	59·94	14·231	67·32
29·9	37·52	62·28	32·448	61·32	14·149	69·01
Aug. 8·8	37·09	64·04	32·351	62·46	14·032	70·41
18·8	36·61	65·35	32·225	63·36	13·885	71·49
28·8	36·10	66·16	32·074	63·99	13·713	72·23
Sept. 7·8	35·56	66·47	31·906	64·33	13·523	72·62
17·7	35·00	66·25	31·730	64·38	13·325	72·64
27·7	34·45	65·50	31·554	64·14	13·127	72·28
Oct. 7·7	33·92	64·24	31·388	63·60	12·940	71·55
17·6	33·43	62·48	31·242	62·75	12·772	70·44
27·6	32·99	60·24	31·124	61·61	12·633	68·96
Nov. 6·6	32·62	57·56	31·042	60·18	12·532	67·15
16·6	32·33	54·51	31·003	58·48	12·475	65·02
26·5	32·13	51·15	31·011	56·54	12·466	62·61
Dec. 6·5	32·03	47·56	31·067	54·40	12·508	59·99
16·5	32·04	43·84	31·172	52·11	12·602	57·21
26·5	32·15	40·11	31·323	49·74	12·745	54·35
36·4	32·37	36·48	31·516	47·36	12·932	51·54
Mean Place	34·893	58·26	29·962	64·09	11·719	69·74
Sec δ, Tan δ	2·439	+2·225	1·033	+0·258	1·103	+0·465
a, a'	+0·2	-4·5	+2·7	-4·2	+2·5	-4·2
b, b'	-0·03	+1·0	0·00	+1·0	-0·01	+1·0
Authority and Catalogue No.	B. J.	1042	B. J.	1045	B. J.	1046

‡ Second transit, June 9.

† First transit, June 10.

APPARENT PLACES OF STARS, 1931.

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AT UPPER TRANSIT AT GREENWICH.

Name	π Herculis		θ Ophiuchi		β Aræ	
	3.36	K5	3.37	B3	2.80	K2
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 17	^m 12	^h 17	^m 17	^h 17	^m 19
		^s +36 52		^s -24 55		^s -55 27
Jan. 1.4	36.776	56.26	44.315	61.78	30.606	62.99
11.4	36.990	53.09	44.568	62.05	30.972	61.57
21.4	37.246	50.15	44.853	62.41	31.391	60.40
31.4	37.536	47.54	45.164	62.85	31.854	59.51
Feb. 10.3	37.852	45.35	45.492	63.33	32.348	58.90
20.3	38.185	43.66	45.831	63.83	32.863	58.58
Mar. 2.3	38.527	42.53	46.175	64.31	33.388	58.54
12.3	38.871	42.00	46.518	64.75	33.915	58.78
22.2	39.209	42.07	46.856	65.15	34.437	59.28
Apr. 1.2	39.535	42.72	47.185	65.49	34.945	60.03
11.2	39.843	43.91	47.503	65.78	35.434	61.00
21.1	40.127	45.59	47.804	66.02	35.896	62.19
May 1.1	40.383	47.68	48.086	66.23	36.326	63.57
11.1	40.606	50.09	48.345	66.42	36.716	65.12
21.1	40.793	52.74	48.576	66.59	37.061	66.82
31.0	40.939	55.54	48.777	66.77	37.354	68.63
June 10.0	41.044	58.38	48.944	66.97	37.590	70.51
19.9	41.104	61.20	49.072	67.18	37.764	72.43
29.9	41.119	63.90	49.160	67.39	37.872	74.33
July 9.9	41.088	66.42	49.205	67.63	37.913	76.16
19.9	41.014	68.70	49.208	67.85	37.886	77.88
29.9	40.898	70.67	49.169	68.07	37.794	79.43
Aug. 8.8	40.744	72.31	49.091	68.25	37.641	80.75
18.8	40.557	73.56	48.979	68.38	37.435	81.79
28.8	40.345	74.41	48.838	68.45	37.186	82.52
Sept. 7.8	40.114	74.83	48.677	68.44	36.906	82.90
17.7	39.874	74.81	48.505	68.35	36.610	82.91
27.7	39.634	74.34	48.332	68.18	36.313	82.54
Oct. 7.7	39.405	73.43	48.170	67.94	36.033	81.79
17.7	39.198	72.07	48.029	67.64	35.786	80.71
27.6	39.022	70.29	47.920	67.31	35.587	79.33
Nov. 6.6	38.886	68.12	47.851	66.98	35.450	77.70
16.6	38.798	65.59	47.830	66.67	35.386	75.90
26.5	38.762	62.76	47.860	66.43	35.401	74.00
Dec. 6.5	38.783	59.70	47.943	66.27	35.499	72.07
16.5	38.861	56.49	48.079	66.22	35.679	70.19
26.5	38.994	53.22	48.265	66.28	35.936	68.44
36.4	39.178	49.99	48.494	66.46	36.264	66.86
Mean Place	38.498	69.29	46.153	55.84	33.523	60.17
Sec δ , Tan δ	1.250	+0.750	1.103	-0.465	1.764	-1.453
a, a'	+2.1	-4.1	+3.7	-3.7	+5.0	-3.5
b, b'	-0.01	+1.0	+0.01	+1.0	+0.02	+1.0
Authority and Catalogue No.	B.J.	1047	B.J.	1052	B.J.	1055

† First transit, June 10.

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name	σ Ophiuchi		ν Scorpii		α Aræ	
Mag. Spect.	4.44	Ko	2.80	B ₃	2.97	B _{3p}
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 17 ^m 23	[°] +4 ['] 11	^h 17 ^m 26	[°] -37 ['] 14	^h 17 ^m 26	[°] -49 ['] 49
Jan. 1.4	03.734 ^s 211	47.06 186	02.110 ^s 273	37.64 49	27.666 ^s 322	27.72 118
11.4	03.945 243	45.20 179	02.383 312	37.15 33	27.988 371	26.54 98
21.4	04.188 267	43.41 166	02.695 343	36.82 19	28.359 408	25.56 74
31.4	04.455 285	41.75 145	03.038 364	36.63 5	28.767 437	24.82 50
Feb. 10.3	04.740 297	40.30 119	03.402 378	36.58 7	29.204 456	24.32 27
20.3	05.037 304	39.11 89	03.780 386	36.65 19	29.660 466	24.05 4
Mar. 2.3	05.341 304	38.22 55	04.166 387	36.84 28	30.126 469	24.01 19
12.3	05.645 301	37.67 20	04.553 384	37.12 37	30.595 465	24.20 39
22.2	05.946 292	37.47 15	04.937 376	37.49 44	31.060 455	24.59 59
Apr. 1.2	06.238 282	37.62 47	05.313 363	37.93 51	31.515 439	25.18 76
11.2	06.520 267	38.09 76	05.676 346	38.44 58	31.954 417	25.94 95
21.1	06.787 249	38.85 102	06.022 325	39.02 65	32.371 391	26.89 111
May 1.1	07.036 227	39.87 121	06.347 299	39.67 71	32.762 358	28.00 126
11.1	07.263 202	41.08 136	06.646 270	40.38 77	33.120 320	29.26 139
21.1	07.465 174	42.44 145	06.916 234	41.15 83	33.440 276	30.65 148
31.0	07.639 141	43.89 149	07.150 194	41.98 87	33.716 226	32.13 156
June 10.0	07.780 107	45.38 146	07.344 151	42.85 91	33.942 172	33.69 161
19.9	07.887 70	46.84 142	07.495 104	43.76 92	34.114 115	35.30 161
29.9	07.957 32	48.26 132	07.599 56	44.68 90	34.229 55	36.91 157
July 9.9	07.989 6	49.58 121	07.655 7	45.58 86	34.284 6	38.48 148
19.9	07.983 43	50.79 105	07.662 41	46.44 79	34.278 64	39.96 135
29.9	07.940 79	51.84 89	07.621 87	47.23 68	34.214 120	41.31 117
Aug. 8.8	07.861 109	52.73 71	07.534 127	47.91 54	34.094 168	42.48 93
18.8	07.752 135	53.44 52	07.407 159	48.45 38	33.926 208	43.41 67
28.8	07.617 153	53.96 32	07.248 184	48.83 20	33.718 238	44.08 38
Sept. 7.8	07.464 164	54.28 12	07.064 198	49.03 1	33.480 254	44.46 6
17.7	07.300 166	54.40 9	06.866 201	49.02 21	33.226 256	44.52 28
27.7	07.134 157	54.31 30	06.665 190	48.81 41	32.970 244	44.24 60
Oct. 7.7	06.977 140	54.01 53	06.475 168	48.40 59	32.726 216	43.64 89
17.7	06.837 113	53.48 75	06.307 133	47.81 74	32.510 175	42.75 115
27.6	06.724 78	52.77 96	06.174 88	47.07 85	32.335 122	41.60 137
Nov. 6.6	06.646 37	51.77 118	06.086 37	46.22 93	32.213 58	40.23 153
16.6	06.609 8	50.59 138	06.049 21	45.29 94	32.155 12	38.70 161
26.5	06.617 104	49.21 157	06.070 81	44.35 84	32.167 158	37.09 163
Dec. 6.5	06.673 148	47.64 170	06.151 139	43.43 74	32.252 226	35.46 159
16.5	06.777 189	45.94 180	06.290 247	42.59 61	32.410 288	33.87 148
26.5	06.925 183	44.14 183	06.487 247	41.85 61	32.636 288	32.39 132
36.4	07.114	42.31	06.734	41.24	32.924	31.07
Mean Place	05.329	56.60	04.219	32.57	30.248	23.84
Sec δ , Tan δ	1.003	+0.073	1.256	-0.760	1.550	-1.184
a, a'	+3.0	-3.2	+4.1	-3.0	+4.6	-2.9
b, b'	0.00	+1.0	+0.01	+1.0	+0.01	+1.0
Authority and Catalogue No.	N.A.	1060	A.N.	1063	B.J.	1064

APPARENT PLACES OF STARS, 1931.

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AT UPPER TRANSIT AT GREENWICH.

Name Mag. Spect.	β Draconis		λ Scorpii		α Ophiuchi	
	2.99	Go	1.71	B2	2.14	A5
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ₁₇ ^m ₂₈	[°] ₊₅₂ ['] ₂₀	^h ₁₇ ^m ₂₈	[°] ₋₃₇ ['] ₀₃	^h ₁₇ ^m ₃₁	[°] ₊₁₂ ['] ₃₆
Jan. 1.4	^s _{50.098} ₂₀₄	^s _{53.26} ₃₅₀	^s _{53.115} ₂₇₁	^s _{23.68} ₅₀	^s _{42.167} ₁₉₉	^s _{22.01} ₂₂₆
11.4	_{50.302} ₂₆₃	_{49.76} ₃₂₆	_{53.386} ₃₀₉	_{23.18} ₃₅	_{42.366} ₂₃₂	_{19.75} ₂₁₅
21.4	_{50.565} ₃₁₅	_{46.50} ₂₉₁	_{53.695} ₃₃₉	_{22.83} ₂₀	_{42.598} ₂₅₉	_{17.60} ₁₉₇
31.4	_{50.880} ₃₅₇	_{43.59} ₂₄₆	_{54.034} ₃₆₂	_{22.63} ₇	_{42.857} ₂₇₉	_{15.63} ₁₇₂
Feb. 10.3	_{51.237} ₃₈₈	_{41.13} ₁₉₁	_{54.396} ₃₇₇	_{22.56} ₅	_{43.136} ₂₉₃	_{13.91} ₁₃₉
20.3	_{51.625} ₄₀₈	_{39.22} ₁₃₀	_{54.773} ₃₈₄	_{22.61} ₁₆	_{43.429} ₃₀₂	_{12.52} ₁₀₁
Mar. 2.3	_{52.033} ₄₁₇	_{37.92} ₆₄	_{55.157} ₃₈₇	_{22.77} ₂₆	_{43.731} ₃₀₄	_{11.51} ₆₀
12.3	_{52.450} ₄₁₆	_{37.28} ₁	_{55.544} ₃₈₃	_{23.03} ₃₃	_{44.035} ₃₀₂	_{10.91} ₁₇
22.2	_{52.866} ₄₀₄	_{37.29} ₆₆	_{55.927} ₃₇₅	_{23.36} ₄₁	_{44.337} ₂₉₆	_{10.74} ₂₆
Apr. 1.2	_{53.270} ₃₈₂	_{37.95} ₁₂₇	_{56.302} ₃₆₄	_{23.77} ₄₈	_{44.633} ₂₈₅	_{11.00} ₆₅
11.2	_{53.652} ₃₅₃	_{39.22} ₁₈₂	_{56.666} ₃₄₇	_{24.25} ₅₄	_{44.918} ₂₇₁	_{11.65} ₁₀₁
21.1	_{54.005} ₃₁₅	_{41.04} ₂₃₀	_{57.013} ₃₂₆	_{24.79} ₆₁	_{45.189} ₂₅₃	_{12.66} ₁₃₂
May 1.1	_{54.320} ₂₇₁	_{43.34} ₂₆₇	_{57.339} ₃₀₁	_{25.40} ₆₈	_{45.442} ₂₃₁	_{13.98} ₁₅₆
11.1	_{54.591} ₂₂₂	_{46.01} ₂₉₆	_{57.640} ₂₇₂	_{26.08} ₇₄	_{45.673} ₂₀₅	_{15.54} ₁₇₆
21.1	_{54.813} ₁₆₇	_{48.97} ₃₁₄	_{57.912} ₂₃₆	_{26.82} ₈₀	_{45.878} ₁₇₆	_{17.30} ₁₈₇
31.0	_{54.980} ₁₁₀	_{52.11} ₃₂₃	_{58.148} ₁₉₇	_{27.62} ₈₅	_{46.054} ₁₄₃	_{19.17} ₁₉₃
June 10.0	_{55.090} ₅₁	_{55.34} ₃₂₂	_{58.345} ₁₅₅	_{28.47} ₈₈	_{46.197} ₁₀₇	_{21.10} ₁₉₂
19.9	_{55.141} ₁₁	_{58.56} ₃₁₃	_{58.500} ₁₀₈	_{29.35} ₈₉	_{46.304} ₇₀	_{23.02} ₁₈₇
29.9	_{55.130} ₇₀	_{61.69} ₂₉₃	_{58.608} ₅₉	_{30.24} ₉₀	_{46.374} ₃₁	_{24.89} ₁₇₄
July 9.9	_{55.060} ₁₂₆	_{64.62} ₂₆₈	_{58.667} ₁₀	_{31.14} ₈₆	_{46.405} ₈	_{26.63} ₁₆₀
19.9	_{54.934} ₁₈₁	_{67.30} ₂₃₆	_{58.677} ₃₈	_{32.00} ₇₉	_{46.397} ₄₇	_{28.23} ₁₄₀
29.9	_{54.753} ₂₃₀	_{69.66} ₁₉₈	_{58.639} ₈₄	_{32.79} ₆₉	_{46.350} ₈₃	_{29.63} ₁₁₉
Aug. 8.8	_{54.523} ₂₇₃	_{71.64} ₁₅₆	_{58.555} ₁₂₅	_{33.48} ₅₅	_{46.267} ₁₁₄	_{30.82} ₉₅
18.8	_{54.250} ₃₀₇	_{73.20} ₁₁₂	_{58.430} ₁₅₈	_{34.03} ₄₀	_{46.153} ₁₄₂	_{31.77} ₇₀
28.8	_{53.943} ₃₃₁	_{74.32} ₆₃	_{58.272} ₁₈₄	_{34.43} ₂₁	_{46.011} ₁₆₁	_{32.47} ₄₃
Sept. 7.8	_{53.612} ₃₄₅	_{74.95} ₁₃	_{58.088} ₁₉₈	_{34.64} ₁	_{45.850} ₁₇₃	_{32.90} ₁₆
17.7	_{53.267} ₃₄₈	_{75.08} ₃₈	_{57.890} ₂₀₀	_{34.65} ₁₉	_{45.677} ₁₇₆	_{33.06} ₁₃
27.7	_{52.919} ₃₃₈	_{74.70} ₈₈	_{57.690} ₁₉₁	_{34.46} ₃₉	_{45.501} ₁₇₀	_{32.93} ₄₁
Oct. 7.7	_{52.581} ₃₁₆	_{73.82} ₁₃₈	_{57.499} ₁₆₉	_{34.07} ₅₇	_{45.331} ₁₅₃	_{32.52} ₇₀
17.7	_{52.265} ₂₈₂	_{72.44} ₁₈₇	_{57.330} ₁₃₅	_{33.50} ₇₂	_{45.178} ₁₂₇	_{31.82} ₉₈
27.6	_{51.983} ₂₃₆	_{70.57} ₂₃₂	_{57.195} ₉₂	_{32.78} ₈₃	_{45.051} ₉₃	_{30.84} ₁₂₇
Nov. 6.6	_{51.747} ₁₈₁	_{68.25} ₂₇₂	_{57.103} ₃₉	_{31.95} ₉₁	_{44.958} ₅₄	_{29.57} ₁₅₃
16.6	_{51.566} ₁₁₇	_{65.53} ₃₀₇	_{57.064} ₁₈	_{31.04} ₉₃	_{44.904} ₈	_{28.04} ₁₇₇
26.5	_{51.449} ₄₉	_{62.46} ₃₃₅	_{57.082} ₇₇	_{30.11} ₉₁	_{44.896} ₃₉	_{26.27} ₁₉₇
Dec. 6.5	_{51.400} ₂₂	_{59.11} ₃₅₂	_{57.159} ₁₃₇	_{29.20} ₈₅	_{44.935} ₈₈	_{24.30} ₂₁₃
16.5	_{51.422} ₉₄	_{55.59} ₃₆₀	_{57.296} ₁₉₃	_{28.35} ₇₄	_{45.023} ₁₃₃	_{22.17} ₂₂₂
26.5	_{51.516} ₁₆₃	_{51.99} ₃₅₅	_{57.489} ₂₄₃	_{27.61} ₆₁	_{45.156} ₁₇₅	_{19.95} ₂₂₅
36.4	_{51.679}	_{48.44}	_{57.732}	_{27.00}	_{45.331}	_{17.70}
Mean Place	52.275	66.60	55.221	18.42	43.778	32.42
Sec δ , Tan δ	1.637	+1.296	1.253	-0.755	1.025	+0.224
a, a'	+1.4	-2.7	+4.1	-2.7	+2.8	-2.5
b, b'	-0.01	+1.0	+0.01	+1.0	0.00	+1.0
Authority and Catalogue No.	B.J.	1067	B.J.	1066	B.J.	1070

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name	θ Scorpii		κ Scorpii		η Pavonis	
	2.04	Fo	2.51	Bz	3.58	Ko
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 17 ^m 32	[°] —42 ['] 57	^h 17 ^m 37	[°] —38 ['] 59	^h 17 ^m 38	[°] —64 ['] 41
Jan. 1.5	19.157 ^s	25.16 ["]	40.532 ^s	51.76 ["]	53.60 ^s	39.43 ["]
11.4	19.442 ^s	24.30 ["]	40.797 ^s	51.09 ["]	54.02 ^s	37.41 ["]
21.4	19.771 ^s	23.61 ["]	41.104 ^s	50.57 ["]	54.52 ^s	35.64 ["]
31.4	20.134 ^s	23.11 ["]	41.444 ^s	50.19 ["]	55.08 ^s	34.16 ["]
Feb. 10.3	20.522 ^s	22.78 ["]	41.808 ^s	49.95 ["]	55.69 ^s	32.99 ["]
20.3	20.927 ^s	22.63 ["]	42.189 ^s	49.85 ["]	56.34 ^s	32.17 ["]
Mar. 2.3	21.341 ^s	22.64 ["]	42.580 ^s	49.88 ["]	57.00 ^s	31.69 ["]
12.3	21.759 ^s	22.80 ["]	42.975 ^s	50.01 ["]	57.68 ^s	31.56 ["]
22.2	22.175 ^s	23.11 ["]	43.368 ^s	50.25 ["]	58.36 ^s	31.77 ["]
Apr. 1.2	22.582 ^s	23.55 ["]	43.755 ^s	50.58 ["]	59.03 ^s	32.31 ["]
11.2	22.977 ^s	24.10 ["]	44.132 ^s	51.00 ["]	59.67 ^s	33.17 ["]
21.2	23.355 ^s	24.78 ["]	44.493 ^s	51.52 ["]	60.29 ^s	34.33 ["]
May 1.1	23.710 ^s	25.58 ["]	44.834 ^s	52.12 ["]	60.87 ^s	35.76 ["]
11.1	24.038 ^s	26.49 ["]	45.151 ^s	52.81 ["]	61.39 ^s	37.44 ["]
21.1	24.333 ^s	27.50 ["]	45.437 ^s	53.58 ["]	61.86 ^s	39.34 ["]
31.0	24.590 ^s	28.59 ["]	45.688 ^s	54.43 ["]	62.27 ^s	41.42 ["]
June 10.0	24.804 ^s	29.75 ["]	45.899 ^s	55.35 ["]	62.59 ^s	43.63 ["]
19.9	24.972 ^s	30.96 ["]	46.066 ^s	56.32 ["]	62.84 ^s	45.92 ["]
29.9	25.090 ^s	32.19 ["]	46.186 ^s	57.32 ["]	63.01 ^s	48.23 ["]
July 9.9	25.153 ^s	33.40 ["]	46.255 ^s	58.31 ["]	63.07 ^s	50.50 ["]
19.9	25.163 ^s	34.56 ["]	46.273 ^s	59.27 ["]	63.04 ^s	52.67 ["]
29.9	25.120 ^s	35.63 ["]	46.240 ^s	60.17 ["]	62.93 ^s	54.67 ["]
Aug. 8.9	25.027 ^s	36.57 ["]	46.160 ^s	60.97 ["]	62.74 ^s	56.44 ["]
18.8	24.889 ^s	37.33 ["]	46.037 ^s	61.63 ["]	62.47 ^s	57.90 ["]
28.8	24.715 ^s	37.89 ["]	45.879 ^s	62.13 ["]	62.14 ^s	59.00 ["]
Sept. 7.8	24.513 ^s	38.21 ["]	45.693 ^s	62.43 ["]	61.76 ^s	59.71 ["]
17.7	24.294 ^s	38.28 ["]	45.490 ^s	62.52 ["]	61.35 ^s	59.98 ["]
27.7	24.072 ^s	38.09 ["]	45.283 ^s	62.39 ["]	60.94 ^s	59.80 ["]
Oct. 7.7	23.860 ^s	37.63 ["]	45.084 ^s	62.03 ["]	60.54 ^s	59.17 ["]
17.7	23.670 ^s	36.94 ["]	44.905 ^s	61.48 ["]	60.17 ^s	58.10 ["]
27.6	23.517 ^s	36.04 ["]	44.759 ^s	60.74 ["]	59.86 ^s	56.63 ["]
Nov. 6.6	23.411 ^s	34.97 ["]	44.657 ^s	59.86 ["]	59.63 ^s	54.83 ["]
16.6	23.360 ^s	33.79 ["]	44.606 ^s	58.88 ["]	59.48 ^s	52.75 ["]
26.6	23.371 ^s	32.54 ["]	44.613 ^s	57.86 ["]	59.43 ^s	50.49 ["]
Dec. 6.5	23.446 ^s	31.29 ["]	44.681 ^s	56.83 ["]	59.49 ^s	48.12 ["]
16.5	23.585 ^s	30.08 ["]	44.809 ^s	55.85 ["]	59.66 ^s	45.73 ["]
26.5	23.786 ^s	28.97 ["]	44.994 ^s	54.95 ["]	59.93 ^s	43.41 ["]
36.4	24.042 ^s	27.99 ["]	45.232 ^s	54.17 ["]	60.29 ^s	41.24 ["]
Mean Place	21.448	20.22	42.695	46.09	57.402	35.60
Sec δ , Tan δ	1.366	—0.931	1.287	—0.810	2.339	—2.115
a, a'	+4.3	—2.4	+4.1	—1.9	+5.9	—1.8
b, b'	+0.01	+1.0	0.00	+1.0	+0.01	+1.0
Authority and Catalogue No.	B. J.	1071	A. N.	1075	B. J.	1079

APPARENT PLACES OF STARS, 1931.

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AT UPPER TRANSIT AT GREENWICH.

Name	β Ophiuchi			ι^1 Scorpii			μ Herculis		
	Mag.	Spect.	2.94	Ko	3.14	F5 p	3.48	G5	
Mean Solar Date	R.A.		Dec.	R.A.		Dec.	R.A.		Dec.
	h	m	° ' "	h	m	° ' "	h	m	° ' "
	17	40	+ 4 35	17	42	-40 06	17	43	+27 45
Jan. 1.5	02.098	196	31.58 183	43.180	264	12.87 76	43.637	180	24.82 290
11.4	02.294	229	29.75 177	43.444	306	12.11 63	43.817	218	21.92 275
21.4	02.523	256	27.98 163	43.750	339	11.48 48	44.035	252	19.17 250
31.4	02.779	275	26.35 144	44.089	365	11.00 33	44.287	278	16.67 216
Feb. 10.4	03.054	290	24.91 118	44.454	384	10.67 19	44.565	297	14.51 174
20.3	03.344	298	23.73 87	44.838	395	10.48 6	44.862	311	12.77 127
Mar. 2.3	03.642	302	22.86 53	45.233	400	10.42 7	45.173	317	11.50 74
12.3	03.944	301	22.33 19	45.633	400	10.49 17	45.490	318	10.76 19
22.2	04.245	296	22.14 17	46.033	394	10.66 29	45.808	313	10.57 35
Apr. 1.2	04.541	288	22.31 50	46.427	385	10.95 38	46.121	303	10.92 86
11.2	04.829	275	22.81 81	46.812	369	11.33 49	46.424	287	11.78 133
21.2	05.104	260	23.62 106	47.181	350	11.82 60	46.711	267	13.11 173
May 1.1	05.364	239	24.68 127	47.531	325	12.42 69	46.978	243	14.84 207
11.1	05.603	215	25.95 142	47.856	295	13.11 78	47.221	213	16.91 232
21.1	05.818	188	27.37 153	48.151	260	13.89 88	47.434	180	19.23 249
31.1	06.006	157	28.90 156	48.411	220	14.77 95	47.614	143	21.72 258
June 10.0	06.163	122	30.46 155	48.631	175	15.72 101	47.757	105	24.30 259
19.9	06.285	84	32.01 151	48.806	126	16.73 105	47.862	62	26.89 255
29.9	06.369	46	33.52 141	48.932	75	17.78 105	47.924	19	29.44 240
July 9.9	06.415	8	34.93 128	49.007	23	18.83 103	47.943	24	31.84 221
19.9	06.423	32	36.21 113	49.030	29	19.86 96	47.919	66	34.05 197
29.9	06.391	69	37.34 96	49.001	77	20.82 86	47.853	105	36.02 169
Aug. 8.9	06.322	101	38.30 78	48.924	122	21.68 73	47.748	140	37.71 137
18.8	06.221	130	39.08 59	48.802	159	22.41 56	47.608	170	39.08 102
28.8	06.091	151	39.67 38	48.643	188	22.97 35	47.438	192	40.10 65
Sept. 7.8	05.940	163	40.05 17	48.455	206	23.32 13	47.246	206	40.75 27
17.8	05.777	168	40.22 4	48.249	211	23.45 9	47.040	211	41.02 12
27.7	05.609	163	40.18 25	48.038	204	23.36 33	46.829	206	40.90 52
Oct. 7.7	05.446	147	39.93 48	47.834	185	23.03 55	46.623	191	40.38 92
17.7	05.299	123	39.45 69	47.649	152	22.48 74	46.432	167	39.46 131
27.6	05.176	91	38.76 91	47.497	109	21.74 90	46.265	133	38.15 169
Nov. 6.6	05.085	50	37.85 114	47.388	58	20.84 102	46.132	92	36.46 204
16.6	05.035	7	36.71 134	47.330	1	19.82 108	46.040	45	34.42 234
26.6	05.028	40	35.37 151	47.331	61	18.74 109	45.995	4	32.08 259
Dec. 6.5	05.068	87	33.86 166	47.392	123	17.65 106	45.999	55	29.49 279
16.5	05.155	131	32.20 176	47.515	181	16.59 98	46.054	105	26.70 289
26.5	05.286	173	30.44 180	47.696	235	15.61 88	46.159	152	23.81 291
36.5	05.459		28.64	47.931		14.73	46.311		20.90
Mean Place	03.725		41.27	45.376		06.95	45.359		36.19
Sec δ , Tan δ	1.003		+0.080	1.307		-0.842	1.130		+0.526
a, a'	+3.0		-1.7	+4.2		-1.5	+2.4		-1.4
b, b'	0.00		+1.0	0.00		+1.0	0.00		+1.0
Authority and Catalogue No.	B. J.		1080	A. N.		1081	B. J.		1084

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name	G Scorpii		89 Herculis		γ Draconis	
	3.25	K2	5.48	F5p	2.42	K5
Mag. Spect.						
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ₁₇ ^m ₄₅	[°] ₋₃₇ ['] ₀₁	^h ₁₇ ^m ₅₂	[°] ₊₂₆ ['] ₀₃	^h ₁₇ ^m ₅₄	[°] ₊₅₁ ['] ₂₉
Jan. 1.5	07.552 ^s	29.06 ["]	36.302 ^s	24.75 ["]	57.823 ^s	35.08 ["]
11.4	07.805 ^s 253	28.45 ["] 61	36.474 ^s 172	21.95 ["] 280	57.986 ^s 163	31.57 ["] 351
21.4	08.098 ^s 293	27.97 ["] 48	36.684 ^s 210	19.28 ["] 267	58.210 ^s 224	28.24 ["] 333
31.4	08.423 ^s 325	27.62 ["] 35	36.927 ^s 243	16.84 ["] 244	58.488 ^s 278	25.20 ["] 304
Feb. 10.4	08.773 ^s 350	27.38 ["] 24	37.198 ^s 271	14.72 ["] 212	58.812 ^s 324	22.58 ["] 262
	369	12	291	172	361	213
20.3	09.142 ^s 379	27.26 ["] 2	37.489 ^s 305	13.00 ["] 126	59.173 ^s 387	20.45 ["] 154
Mar. 2.3	09.521 ^s 384	27.24 ["] 7	37.794 ^s 313	11.74 ["] 74	59.560 ^s 403	18.91 ["] 91
12.3	09.905 ^s 384	27.31 ["] 15	38.107 ^s 315	11.00 ["] 21	59.963 ^s 409	18.00 ["] 26
22.2	10.289 ^s 380	27.46 ["] 23	38.422 ^s 312	10.79 ["] 31	60.372 ^s 405	17.74 ["] 40
Apr. 1.2	10.669 ^s 370	27.69 ["] 30	38.734 ^s 304	11.10 ["] 82	60.777 ^s 391	18.14 ["] 102
11.2	11.039 ^s 357	27.99 ["] 38	39.038 ^s 291	11.92 ["] 128	61.168 ^s 368	19.16 ["] 160
21.2	11.396 ^s 339	28.37 ["] 46	39.329 ^s 271	13.20 ["] 168	61.536 ^s 337	20.76 ["] 211
May 1.1	11.735 ^s 315	28.83 ["] 54	39.600 ^s 249	14.88 ["] 202	61.873 ^s 299	22.87 ["] 253
11.1	12.050 ^s 288	29.37 ["] 61	39.849 ^s 222	16.90 ["] 227	62.172 ^s 254	25.40 ["] 286
21.1	12.338 ^s 254	29.98 ["] 70	40.071 ^s 190	19.17 ["] 246	62.426 ^s 203	28.26 ["] 310
31.1	12.592 ^s 215	30.68 ["] 77	40.261 ^s 153	21.63 ["] 255	62.629 ^s 148	31.36 ["] 323
June 10.0	12.807 ^s 173	31.45 ["] 82	40.414 ^s 116	24.18 ["] 258	62.777 ^s 91	34.50 ["] 328
20.0	12.980 ^s 126	32.27 ["] 87	40.530 ^s 73	26.76 ["] 252	62.868 ^s 29	37.87 ["] 323
29.9	13.106 ^s 77	33.14 ["] 88	40.603 ^s 31	29.28 ["] 240	62.897 ^s 30	41.10 ["] 309
July 9.9	13.183 ^s 27	34.02 ["] 87	40.634 ^s 12	31.68 ["] 223	62.867 ^s 89	44.19 ["] 287
19.9	13.210 ^s 23	34.89 ["] 82	40.622 ^s 55	33.91 ["] 200	62.778 ^s 147	47.06 ["] 260
29.9	13.187 ^s 70	35.71 ["] 74	40.567 ^s 94	35.91 ["] 173	62.631 ^s 199	49.66 ["] 226
Aug. 8.9	13.117 ^s 113	36.45 ["] 63	40.473 ^s 130	37.64 ["] 142	62.432 ^s 245	51.92 ["] 187
18.8	13.004 ^s 150	37.08 ["] 49	40.343 ^s 160	39.06 ["] 109	62.187 ^s 285	53.79 ["] 144
28.8	12.854 ^s 178	37.57 ["] 32	40.183 ^s 184	40.15 ["] 74	61.902 ^s 315	55.23 ["] 98
Sept. 7.8	12.676 ^s 194	37.89 ["] 13	39.999 ^s 200	40.89 ["] 36	61.587 ^s 334	56.21 ["] 49
17.8	12.482 ^s 201	38.02 ["] 8	39.799 ^s 205	41.25 ["] 2	61.253 ^s 342	56.70 ["] 2
27.7	12.281 ^s 195	37.94 ["] 28	39.594 ^s 202	41.23 ["] 4	60.911 ^s 339	56.68 ["] 52
Oct. 7.7	12.086 ^s 176	37.66 ["] 46	39.392 ^s 189	40.82 ["] 80	60.572 ^s 323	56.16 ["] 104
17.7	11.910 ^s 146	37.20 ["] 63	39.203 ^s 166	40.02 ["] 119	60.249 ^s 295	55.12 ["] 153
27.6	11.764 ^s 105	36.57 ["] 77	39.037 ^s 133	38.83 ["] 155	59.954 ^s 255	53.59 ["] 200
Nov. 6.6	11.659 ^s 55	35.80 ["] 86	38.904 ^s 95	37.28 ["] 189	59.699 ^s 206	51.59 ["] 245
16.6	11.604 ^s —	34.94 ["] 92	38.809 ^s 50	35.39 ["] 221	59.493 ^s 147	49.14 ["] 283
26.6	11.604 ^s 58	34.02 ["] 92	38.759 ^s 1	33.18 ["] 246	59.346 ^s 84	46.31 ["] 315
Dec. 6.5	11.662 ^s 117	33.10 ["] 87	38.758 ^s 49	30.72 ["] 266	59.262 ^s 15	43.16 ["] 338
16.5	11.779 ^s 173	32.23 ["] 81	38.807 ^s 97	28.06 ["] 277	59.247 ^s 55	39.78 ["] 351
26.5	11.952 ^s 225	31.42 ["] 70	38.904 ^s 145	25.29 ["] 280	59.302 ^s 122	36.27 ["] 352
36.5	12.177 ^s	30.72 ["]	39.049 ^s	22.49 ["]	59.424 ^s	32.75 ["]
Mean Place	09.660	22.74	38.031	35.77	60.102	46.92
Sec δ, Tan δ	1.253	-0.754	1.113	+0.489	1.606	+1.257
a, a'	+4.1	-1.3	+2.4	-0.6	+1.4	-0.4
b, b'	0.00	+1.0	0.00	+1.0	0.00	+1.0
Authority and Catalogue No.	A.N.	1086	N.A.	1091	B.J.	1095

† Second transit, June 19.

† First transit, June 20.

APPARENT PLACES OF STARS, 1931.

477

AT UPPER TRANSIT AT GREENWICH.

Name	ν Ophiuchi		γ Sagittarii		72 Ophiuchi	
	3.50	Ko	3.07	Ko	3.73	A3
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ₁₇ ^m ₅₅	[°] _— ['] ₉ [″] ₄₅	^h ₁₈ ^m ₀₁	[°] _— ['] ₃₀ [″] ₂₅	^h ₁₈ ^m ₀₄	[°] ₊ ['] ₉ [″] ₃₂
Jan. 1.5	^s 11.894 196	68.52 97	^s 20.513 220	43.22 30	^s 02.964 169	60.05 202
11.4	12.090 229	69.49 98	20.733 259	42.92 22	03.133 205	58.03 195
21.4	12.319 257	70.47 94	20.992 290	42.70 16	03.338 234	56.08 181
31.4	12.576 278	71.41 84	21.282 316	42.54 9	03.572 258	54.27 159
Feb. 10.4	12.854 293	72.25 71	21.598 334	42.45 4	03.830 276	52.68 131
20.3	13.147 304	72.96 54	21.932 346	42.41 2	04.106 289	51.37 97
Mar. 2.3	13.451 310	73.50 35	22.278 354	42.39 —	04.395 297	50.40 59
12.3	13.761 311	73.85 14	22.632 357	42.39 1	04.692 301	49.81 20
22.3	14.072 308	73.99 8	22.989 355	42.40 2	04.993 299	49.61 21
Apr. 1.2	14.380 303	73.91 27	23.344 350	42.42 3	05.292 294	49.82 58
11.2	14.683 293	73.64 45	23.694 339	42.45 5	05.586 285	50.40 94
21.2	14.976 279	73.19 60	24.033 325	42.50 8	05.871 271	51.34 124
May 1.1	15.255 262	72.59 71	24.358 307	42.58 12	06.142 254	52.58 148
11.1	15.517 240	71.88 79	24.665 282	42.70 18	06.396 232	54.06 168
21.1	15.757 214	71.09 83	24.947 253	42.88 24	06.628 205	55.74 181
31.1	15.971 183	70.26 83	25.200 218	43.12 32	06.833 174	57.55 187
June 10.0	16.154 149	69.43 81	25.418 180	43.44 38	07.007 140	59.42 188
20.0	16.303 112	68.62 75	25.598 136	43.82 44	07.147 102	61.30 185
29.9	16.415 72	67.87 68	25.734 91	44.26 50	07.249 62	63.15 173
July 9.9	16.487 31	67.19 60	25.825 44	44.76 52	07.311 22	64.88 160
19.9	16.518 11	66.59 51	25.869 3	45.28 53	07.333 19	66.48 144
29.9	16.507 50	66.08 41	25.866 50	45.81 51	07.314 58	67.92 124
Aug. 8.9	16.457 86	65.67 32	25.816 92	46.32 47	07.256 93	69.16 103
18.8	16.371 117	65.35 24	25.724 128	46.79 39	07.163 125	70.19 79
28.8	16.254 141	65.11 16	25.596 157	47.18 29	07.038 149	70.98 55
Sept. 7.8	16.113 157	64.95 8	25.439 177	47.47 17	06.889 166	71.53 30
17.8	15.956 164	64.87 —	25.262 185	47.64 4	06.723 173	71.83 5
27.7	15.792 160	64.87 7	25.077 183	47.68 10	06.550 172	71.88 22
Oct. 7.7	15.632 147	64.94 16	24.894 168	47.58 23	06.378 161	71.66 48
17.7	15.485 124	65.10 24	24.726 143	47.35 35	06.217 139	71.18 74
27.7	15.361 92	65.34 35	24.583 108	47.00 44	06.078 110	70.44 100
Nov. 6.6	15.269 53	65.69 46	24.475 63	46.56 50	05.968 74	69.44 124
16.6	15.216 9	66.15 56	24.412 13	46.06 54	05.894 32	68.20 147
26.6	15.207 38	66.71 68	24.399 39	45.52 53	05.862 12	66.73 168
Dec. 6.5	15.245 85	67.39 78	24.438 94	44.99 50	05.874 59	65.05 184
16.5	15.330 130	68.17 86	24.532 146	44.49 45	05.933 104	63.21 195
26.5	15.460 173	69.03 94	24.678 193	44.04 38	06.037 146	61.26 199
36.5	15.633	69.97	24.871	43.66	06.183	59.27
Mean Place	13.595	59.71	22.468	35.51	04.625	70.06
Sec δ , Tan δ	1.015	—0.172	1.160	—0.587	1.014	+0.168
a, a'	+3.3	—0.4	+3.9	+0.1	+2.8	+0.4
b, b'	0.00	+1.0	0.00	+1.0	0.00	+1.0
Authority and Catalogue No.	B.J.	1096	B.J.	1103	B.J.	1105

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name Mag. Spect.	μ Sagittarii		η Sagittarii		δ Sagittarii	
	4·01	B8p	3·16	Mb	2·84	Ko
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ₁₈ ^m ₀₉	[°] _{—21} ['] ₀₄	^h ₁₈ ^m ₁₂	[°] _{—36} ['] ₄₇	^h ₁₈ ^m ₁₆	[°] _{—29} ['] ₅₁
Jan. 1·5	36 ^s ·345	51 ^s ·03	55 ^s ·366	10 ^s ·62	32 ^s ·630	40 ^s ·96
11·5	36 ^s ·541	51 ^s ·26	55 ^s ·586	09 ^s ·86	32 ^s ·833	40 ^s ·61
21·4	36 ^s ·774	51 ^s ·52	55 ^s ·849	09 ^s ·20	33 ^s ·075	40 ^s ·32
31·4	37 ^s ·037	51 ^s ·79	56 ^s ·147	08 ^s ·63	33 ^s ·350	40 ^s ·08
Feb. 10·4	37 ^s ·323	52 ^s ·05	56 ^s ·474	08 ^s ·15	33 ^s ·652	39 ^s ·88
20·3	37 ^s ·628	52 ^s ·28	56 ^s ·823	07 ^s ·76	33 ^s ·975	39 ^s ·71
Mar. 2·3	37 ^s ·945	52 ^s ·44	57 ^s ·189	07 ^s ·46	34 ^s ·312	39 ^s ·56
12·3	38 ^s ·270	52 ^s ·52	57 ^s ·564	07 ^s ·23	34 ^s ·660	39 ^s ·42
22·3	38 ^s ·600	52 ^s ·51	57 ^s ·944	07 ^s ·08	35 ^s ·013	39 ^s ·28
Apr. 1·2	38 ^s ·929	52 ^s ·41	58 ^s ·326	07 ^s ·00	35 ^s ·367	39 ^s ·15
11·2	39 ^s ·255	52 ^s ·22	58 ^s ·703	07 ^s ·00	35 ^s ·719	39 ^s ·02
21·2	39 ^s ·572	51 ^s ·96	59 ^s ·072	07 ^s ·09	36 ^s ·063	38 ^s ·91
May 1·2	39 ^s ·878	51 ^s ·66	59 ^s ·427	07 ^s ·27	36 ^s ·395	38 ^s ·84
11·1	40 ^s ·167	51 ^s ·33	59 ^s ·762	07 ^s ·56	36 ^s ·710	38 ^s ·82
21·1	40 ^s ·435	51 ^s ·01	60 ^s ·073	07 ^s ·94	37 ^s ·003	38 ^s ·85
31·1	40 ^s ·676	50 ^s ·70	60 ^s ·353	08 ^s ·44	37 ^s ·268	38 ^s ·96
June 10·0	40 ^s ·887	50 ^s ·44	60 ^s ·597	09 ^s ·04	37 ^s ·500	39 ^s ·16
20·0	41 ^s ·062	50 ^s ·23	60 ^s ·800	09 ^s ·74	37 ^s ·695	39 ^s ·43
29·9	41 ^s ·197	50 ^s ·09	60 ^s ·957	10 ^s ·51	37 ^s ·847	39 ^s ·79
July 9·9	41 ^s ·290	50 ^s ·02	61 ^s ·065	11 ^s ·34	37 ^s ·953	40 ^s ·21
19·9	41 ^s ·339	50 ^s ·01	61 ^s ·121	12 ^s ·21	38 ^s ·012	40 ^s ·69
29·9	41 ^s ·344	50 ^s ·06	61 ^s ·126	13 ^s ·07	38 ^s ·023	41 ^s ·19
Aug. 8·9	41 ^s ·305	50 ^s ·15	61 ^s ·080	13 ^s ·89	37 ^s ·987	41 ^s ·70
18·9	41 ^s ·227	50 ^s ·26	60 ^s ·988	14 ^s ·64	37 ^s ·907	42 ^s ·18
28·8	41 ^s ·113	50 ^s ·38	60 ^s ·856	15 ^s ·28	37 ^s ·790	42 ^s ·61
Sept. 7·8	40 ^s ·972	50 ^s ·49	60 ^s ·691	15 ^s ·78	37 ^s ·641	42 ^s ·95
17·8	40 ^s ·811	50 ^s ·57	60 ^s ·503	16 ^s ·10	37 ^s ·470	43 ^s ·19
27·7	40 ^s ·641	50 ^s ·62	60 ^s ·303	16 ^s ·23	37 ^s ·287	43 ^s ·31
Oct. 7·7	40 ^s ·471	50 ^s ·63	60 ^s ·102	16 ^s ·16	37 ^s ·105	43 ^s ·30
17·7	40 ^s ·314	50 ^s ·60	59 ^s ·914	15 ^s ·89	36 ^s ·933	43 ^s ·15
27·7	40 ^s ·179	50 ^s ·54	59 ^s ·752	15 ^s ·43	36 ^s ·784	42 ^s ·89
Nov. 6·6	40 ^s ·075	50 ^s ·47	59 ^s ·626	14 ^s ·81	36 ^s ·667	42 ^s ·53
16·6	40 ^s ·011	50 ^s ·40	59 ^s ·545	14 ^s ·06	36 ^s ·592	42 ^s ·09
26·6	39 ^s ·993	50 ^s ·35	59 ^s ·515	13 ^s ·22	36 ^s ·565	41 ^s ·60
Dec. 6·6	40 ^s ·022	50 ^s ·35	59 ^s ·541	12 ^s ·33	36 ^s ·589	41 ^s ·10
16·5	40 ^s ·101	50 ^s ·40	59 ^s ·625	11 ^s ·42	36 ^s ·665	40 ^s ·60
26·5	40 ^s ·229	50 ^s ·51	59 ^s ·765	10 ^s ·54	36 ^s ·793	40 ^s ·14
36·5	40 ^s ·400	50 ^s ·68	59 ^s ·955	09 ^s ·72	36 ^s ·969	39 ^s ·72
Mean Place	38·154	42·42	57·453	02·56	34·567	32·41
Sec δ , Tan δ	1·072	—0·385	1·249	—0·748	1·153	—0·574
a , a'	+3·6	+0·8	+4·1	+1·1	+3·8	+1·4
b , b'	0·00	+1·0	0·00	+1·0	0·00	+1·0
Authority and Catalogue No.	B. J.	1109	A. N.	1111	A. N.	1114

APPARENT PLACES OF STARS, 1931.

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AT UPPER TRANSIT AT GREENWICH.

Name Mag. Spect.	η Serpentis		ε Sagittarii		α Telescopii	
	3·42	Ko	1·95	Ao	3·76	B3
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ^m 18 17	— 2 55	^h ^m 18 19	— 34 25	^h ^m 18 21	— 46 00
Jan. 1·5	42·614 ^s 166	14·65 131	33·504 ^s 208	16·62 64	49·123 ^s 233	37·75 135
11·5	42·780 202	15·96 129	33·712 250	15·98 57	49·356 284	36·40 124
21·4	42·982 230	17·25 120	33·962 285	15·41 50	49·640 327	35·16 111
31·4	43·212 254	18·45 107	34·247 314	14·91 43	49·967 362	34·05 98
Feb. 10·4	43·466 273	19·52 88	34·561 336	14·48 36	50·329 390	33·07 82
20·3	43·739 287	20·40 65	34·897 352	14·12 31	50·719 411	32·25 66
Mar. 2·3	44·026 296	21·05 39	35·249 363	13·81 25	51·130 424	31·59 50
12·3	44·322 301	21·44 11	35·612 370	13·56 21	51·554 432	31·09 33
22·3	44·623 302	21·55 16	35·982 371	13·35 15	51·986 435	30·76 16
Apr. 1·2	44·925 300	21·39 43	36·353 368	13·20 10	52·421 431	30·60 —
11·2	45·225 293	20·96 68	36·721 361	13·10 3	52·852 423	30·60 18
21·2	45·518 283	20·28 89	37·082 349	13·07 4	53·275 408	30·78 36
May 1·2	45·801 268	19·39 105	37·431 332	13·11 12	53·683 387	31·14 53
11·1	46·069 248	18·34 117	37·763 309	13·23 22	54·070 359	31·67 71
21·1	46·317 224	17·17 124	38·072 280	13·45 32	54·429 325	32·38 88
31·1	46·541 195	15·93 127	38·352 245	13·77 43	54·754 283	33·26 102
June 10·0	46·736 161	14·66 125	38·597 205	14·20 53	55·037 237	34·28 116
20·0	46·897 125	13·41 121	38·802 161	14·73 60	55·274 185	35·44 127
29·9	47·022 85	12·20 112	38·963 113	15·33 69	55·459 127	36·71 133
July 9·9	47·107 44	11·08 100	39·076 64	16·02 73	55·586 68	38·04 135
19·9	47·151 3	10·08 88	39·140 13	16·75 75	55·654 9	39·39 134
29·9	47·154 38	09·20 74	39·153 37	17·50 74	55·663 50	40·73 127
Aug. 8·9	47·116 76	08·46 59	39·116 83	18·24 68	55·613 104	42·00 114
18·9	47·040 108	07·87 45	39·033 124	18·92 59	55·509 152	43·14 98
28·8	46·932 135	07·42 30	38·909 157	19·51 48	55·357 191	44·12 77
Sept. 7·8	46·797 154	07·12 16	38·752 180	19·99 33	55·166 219	44·89 52
17·8	46·643 164	06·96 1	38·572 193	20·32 17	54·947 236	45·41 24
27·7	46·479 165	06·95 13	38·379 195	20·49 2	54·711 237	45·65 5
Oct. 7·7	46·314 155	07·08 28	38·184 183	20·47 19	54·474 225	45·60 34
17·7	46·159 135	07·36 43	38·001 160	20·28 36	54·249 199	45·26 63
27·7	46·024 108	07·79 58	37·841 126	19·92 51	54·050 160	44·63 88
Nov. 6·6	45·916 73	08·37 73	37·715 83	19·41 62	53·890 110	43·75 110
16·6	45·843 32	09·10 87	37·632 34	18·79 71	53·780 52	42·65 127
26·6	45·811 12	09·97 101	37·598 21	18·08 76	53·728 10	41·38 139
Dec. 6·6	45·823 57	10·98 114	37·619 75	17·32 77	53·738 75	39·99 144
16·5	45·880 101	12·12 122	37·694 129	16·55 76	53·813 139	38·55 146
26·5	45·981 143	13·34 127	37·823 180	15·79 70	53·952 199	37·09 146
36·5	46·124	14·61	38·003	15·09	54·151	35·67 142
Mean Place	44·294	05·10	35·528	08·10	51·484	29·50
Sec δ, Tan δ	1·001	—0·051	1·212	—0·685	1·440	—1·036
a, a'	+3·1	+1·6	+4·0	+1·7	+4·5	+1·9
b, b'	0·00	+1·0	0·00	+1·0	—0·01	+1·0
Authority and Catalogue No.	B.J.	1116	B.J.	1118	B.J.	1120

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name	χ Draconis		λ Sagittarii		α Lyrae (<i>Vega</i>)	
	3.69	F8	2.94	Ko	0.14	Ao
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ^m 18 22	[°] ['] +72 41	^h ^m 18 23	[°] ['] -25 27	^h ^m 18 34	[°] ['] +38 42
Jan. 1.5	13.45 ^s	62.24 ["] 362	40.851 ["] 187	49.84 ["] 11	34.043 ["] 116	56.91 ["] 316
11.5	13.55	58.62 350	41.038 226	49.73 7	34.159 165	53.75 308
21.4	13.78	55.12 327	41.264 259	49.66 5	34.324 209	50.67 288
31.4	14.15	51.85 291	41.523 284	49.61 4	34.533 248	47.79 258
Feb. 10.4	14.64	48.94 244	41.807 306	49.57 5	34.781 281	45.21 217
20.4	15.23	46.50 188	42.113 321	49.52 7	35.062 307	43.04 168
Mar. 2.3	15.89	44.62 127	42.434 332	49.45 11	35.369 327	41.36 113
12.3	16.62	43.35 61	42.766 338	49.34 16	35.696 339	40.23 54
22.3	17.38	42.74 7	43.104 340	49.18 20	36.035 344	39.69 7
Apr. 1.2	18.15	42.81 72	43.444 340	48.98 24	36.379 344	39.76 65
11.2	18.90	43.53 134	43.784 333	48.74 26	36.723 335	40.41 121
21.2	19.61	44.87 190	44.117 322	48.48 26	37.058 319	41.62 172
May 1.2	20.25	46.77 238	44.439 308	48.22 24	37.377 298	43.34 216
11.1	20.82	49.15 278	44.747 287	47.98 21	37.675 270	45.50 251
21.1	21.29	51.93 308	45.034 261	47.77 16	37.945 235	48.01 279
31.1	21.65	55.01 329	45.295 230	47.61 9	38.180 196	50.80 297
June 10.1	21.89	58.30 339	45.525 195	47.52 7	38.376 152	53.77 308
20.0	22.01	61.69 341	45.720 154	47.52 7	38.528 103	56.85 308
29.9	22.00	65.10 332	45.874 109	47.59 15	38.631 54	59.93 302
July 9.9	21.87	68.42 317	45.983 64	47.74 23	38.685 4	62.95 287
19.9	21.61	71.59 294	46.047 17	47.97 27	38.689 46	65.82 266
29.9	21.24	74.53 263	46.064 28	48.24 31	38.643 95	68.48 240
Aug. 8.9	20.76	77.16 227	46.036 70	48.55 32	38.548 139	70.88 207
18.9	20.18	79.43 186	45.966 108	48.87 31	38.409 179	72.95 172
28.8	19.52	81.29 141	45.858 140	49.18 26	38.230 210	74.67 131
Sept. 7.8	18.80	82.70 92	45.718 162	49.44 20	38.020 235	75.98 90
17.8	18.03	83.62 41	45.556 174	49.64 14	37.785 249	76.88 45
27.8	17.23	84.03 12	45.382 175	49.78 5	37.536 254	77.33 1
Oct. 7.7	16.42	83.91 65	45.207 167	49.83 4	37.282 246	77.32 48
17.7	15.63	83.26 118	45.040 146	49.79 11	37.036 230	76.84 95
27.7	14.88	82.08 169	44.894 115	49.68 18	36.806 203	75.89 139
Nov. 6.6	14.18	80.39 219	44.779 77	49.50 23	36.603 167	74.50 183
16.6	13.57	78.20 262	44.702 32	49.27 26	36.436 123	72.67 223
26.6	13.05	75.58 301	44.670 16	49.01 25	36.313 75	70.44 257
Dec. 6.6	12.65	72.57 330	44.686 67	48.76 23	36.238 23	67.87 285
16.5	12.37	69.27 350	44.753 116	48.53 21	36.215 31	65.02 304
26.5	12.24	65.77 360	44.869 162	48.32 16	36.246 85	61.98 312
36.5	12.25	62.17	45.031	48.16	36.331	58.86
Mean Place	18.065	72.17	42.711	40.80	36.060	66.47
Sec δ , Tan δ	3.363	+3.211	1.108	-0.476	1.282	+0.802
a, a'	-1.2	+1.9	+3.7	+2.1	+2.0	+3.0
b, b'	+0.02	+1.0	0.00	+1.0	+0.01	+1.0
Authority and Catalogue No.	B.J.	1123	A.N.	1125	B.J.	1134

§ Transit, June 30.

APPARENT PLACES OF STARS, 1931.

481

AT UPPER TRANSIT AT GREENWICH.

Name	ζ Pavonis		4 H Scuti		φ Sagittarii	
Mag. Spect.	4.10	Ko	4.74	Fo	3.30	B8
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	18 ^h 34 ^m	−71° 29′	18 ^h 38 ^m	−9° 07′	18 ^h 41 ^m	−27° 03′
Jan. 1.5	54.27	33.38	28.000	21.43	18.878	57.46
11.5	54.64	30.68	28.153	22.28	19.049	57.17
21.4	55.13	28.13	28.342	23.11	19.260	56.90
31.4	55.72	25.78	28.562	23.88	19.505	56.65
Feb. 10.4	56.40	23.69	28.807	24.56	19.779	56.40
20.4	57.15	21.90	29.074	25.09	20.077	56.15
Mar. 2.3	57.97	20.45	29.357	25.45	20.392	55.87
12.3	58.82	19.36	29.653	25.62	20.722	55.57
22.3	59.70	18.65	29.957	25.57	21.061	55.24
Apr. 1.3	60.59	18.32	30.266	25.30	21.405	54.88
11.2	61.47	18.38	30.575	24.82	21.751	54.50
21.2	62.34	18.82	30.882	24.16	22.093	54.11
May 1.2	63.17	19.63	31.181	23.35	22.428	53.74
11.1	63.96	20.80	31.467	22.42	22.750	53.41
21.1	64.68	22.31	31.737	21.41	23.054	53.14
31.1	65.33	24.12	31.984	20.36	23.333	52.94
June 10.1	65.88	26.19	32.202	19.32	23.582	52.83
20.0	66.33	28.46	32.390	18.31	23.796	52.83
30.0	66.68	30.88	32.540	17.37	23.969	52.92
July 9.9	66.89	33.39	32.650	16.53	24.098	53.12
19.9	66.98	35.92	32.717	15.78	24.180	53.40
29.9	66.95	38.38	32.742	15.16	24.215	53.75
Aug. 8.9	66.79	40.69	32.724	14.65	24.201	54.14
18.9	66.51	42.78	32.666	14.26	24.144	54.57
28.8	66.13	44.57	32.573	13.98	24.045	54.98
Sept. 7.8	65.67	45.99	32.449	13.81	23.913	55.35
17.8	65.15	46.97	32.304	13.74	23.755	55.66
27.8	64.58	47.48	32.144	13.76	23.582	55.88
Oct. 7.7	64.00	47.49	31.981	13.86	23.403	56.01
17.7	63.43	46.98	31.824	14.04	23.230	56.03
27.7	62.91	45.97	31.683	14.30	23.076	55.95
Nov. 6.7	62.46	44.49	31.568	14.66	22.949	55.78
16.6	62.10	42.60	31.485	15.10	22.858	55.52
26.6	61.86	40.36	31.442	15.62	22.810	55.21
Dec. 6.6	61.75	37.85	31.441	16.25	22.810	54.87
16.5	61.77	35.17	31.484	16.95	22.859	54.51
26.5	61.92	32.40	31.572	17.71	22.957	54.17
36.5	62.21	29.63	31.701	18.52	23.101	53.84
Mean Place	59.039	24.81	29.702	11.69	20.742	47.69
Sec δ, Tan δ	3.150	−2.987	1.013	−0.161	1.123	−0.511
a, a'	+7.0	+3.0	+3.3	+3.4	+3.7	+3.6
b, b'	−0.03	+1.0	0.00	+1.0	−0.01	+1.0
Authority and Catalogue No.	B.J.	1133	N.A.	1136	N.A.	1138

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name	λ Pavonis		30 Sagittarii		β Lyrae	
Mag. Spect.	4.42	B ₂	6.24	F ₀	Var.	B _{8p} —B _{2p}
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 18 ^m 45	[°] —62 ['] 16	^h 18 ^m 46	[°] —22 ['] 14	^h 18 ^m 47	[°] +33 ['] 16
Jan. 1.5	46.45 ^s	17.72 ["]	39.780 ^s	43.55 ["]	29.917 ^s	44.54 ["]
11.5	46.71	15.39	39.939	43.55	30.023	41.58
21.4	47.05	13.15	40.137	43.55	30.174	38.68
31.4	47.46	11.05	40.367	43.54	30.366	35.94
Feb. 10.4	47.93	09.16	40.627	43.50	30.595	33.48
20.4	48.45	07.49	40.909	43.42	30.854	31.38
Mar. 2.3	49.02	06.09	41.209	43.28	31.140	29.74
12.3	49.61	04.97	41.523	43.06	31.446	28.61
22.3	50.22	04.15	41.848	42.76	31.765	28.03
Apr. 1.3	50.84	03.65	42.179	42.37	32.092	28.03
11.2	51.46	03.46	42.511	41.92	32.421	28.59
21.2	52.08	03.59	42.842	41.42	32.745	29.68
May 1.2	52.68	04.05	43.167	40.88	33.058	31.27
11.1	53.25	04.82	43.479	40.35	33.353	33.27
21.1	53.78	05.90	43.775	39.84	33.625	35.63
31.1	54.26	07.24	44.047	39.37	33.868	38.26
June 10.1	54.69	08.83	44.292	38.98	34.075	41.08
20.0	55.05	10.64	44.503	38.68	34.243	44.00
30.0	55.33	12.61	44.674	38.47	34.365	46.95
July 9.9	55.53	14.69	44.804	38.36	34.442	49.84
19.9	55.64	16.83	44.889	38.35	34.471	52.60
29.9	55.66	18.95	44.926	38.43	34.451	55.18
Aug. 8.9	55.60	20.99	44.918	38.59	34.385	57.51
18.9	55.45	22.86	44.866	38.80	34.275	59.55
28.8	55.23	24.50	44.775	39.03	34.126	61.25
Sept. 7.8	54.95	25.84	44.651	39.27	33.944	62.58
17.8	54.62	26.82	44.501	39.50	33.737	63.52
27.8	54.26	27.41	44.336	39.69	33.514	64.05
Oct. 7.7	53.88	27.57	44.163	39.83	33.285	64.15
17.7	53.51	27.28	43.997	39.93	33.061	63.81
27.7	53.16	26.55	43.846	39.96	32.851	63.03
Nov. 6.7	52.86	25.40	43.722	39.95	32.664	61.82
16.6	52.62	23.88	43.631	39.89	32.510	60.20
26.6	52.47	22.03	43.582	39.82	32.395	58.20
Dec. 6.6	52.40	19.94	43.577	39.74	32.325	55.87
16.5	52.42	17.67	43.619	39.66	32.303	53.26
26.5	52.53	15.31	43.708	39.60	32.330	50.45
36.5	52.74	12.93	43.842	39.57	32.407	47.53
Mean Place	49.752	08.05	41.576	33.57	31.845	53.57
Sec δ , Tan δ	2.149	—1.902	1.080	—0.409	1.196	+0.656
a , a'	+5.6	+4.0	+3.6	+4.1	+2.2	+4.1
b , b'	—0.03	+1.0	—0.01	+1.0	+0.01	+1.0
Authority and Catalogue No.	B.J.	1145	N.A.	1146	B.J.	1147

APPARENT PLACES OF STARS, 1931.

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AT UPPER TRANSIT AT GREENWICH.

Name Mag. Spect.	σ Sagittarii		ξ Sagittarii		γ Lyrae	
	2.14	B ₃	3.61	Ko	3.30	Ao ρ
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ₁₈ ^m ₅₀	[°] ₋₂₀ ['] ₂₃	^h ₁₈ ^m ₅₃	[°] ₋₂₁ ['] ₁₁	^h ₁₈ ^m ₅₆	[°] ₊₃₂ ['] ₃₅
Jan. 1.5	57.405 ^s 160	12.22 29	35.040 ^s 147	66.02 3	19.724 ^s 97	29.30 291
11.5	57.565 200	11.93 27	35.187 189	66.05 4	19.821 141	26.39 286
21.5	57.765 234	11.66 27	35.376 222	66.09 1	19.962 182	23.53 272
31.4	57.999 264	11.39 27	35.598 251	66.10 2	20.144 220	20.81 246
Feb. 10.4	58.263 289	11.12 29	35.849 275	66.08 8	20.364 251	18.35 210
20.4	58.552 308	10.83 32	36.124 294	66.00 16	20.615 278	16.25 167
Mar. 2.3	58.860 322	10.51 37	36.418 309	65.84 24	20.893 299	14.58 116
12.3	59.182 333	10.14 40	36.727 319	65.60 34	21.192 315	13.42 62
22.3	59.515 341	09.74 44	37.046 327	65.26 43	21.507 324	12.80 6
Apr. 1.3	59.856 344	09.30 46	37.373 331	64.83 50	21.831 328	12.74 51
11.2	60.200 342	08.84 48	37.704 330	64.33 57	22.159 325	13.25 104
21.2	60.542 336	08.36 47	38.034 324	63.76 61	22.484 316	14.29 153
May 1.2	60.878 325	07.89 43	38.358 313	63.15 62	22.800 299	15.82 195
11.2	61.203 308	07.46 37	38.671 298	62.53 60	23.099 278	17.77 232
21.1	61.511 285	07.09 30	38.969 276	61.93 56	23.377 250	20.09 259
31.1	61.796 256	06.79 20	39.245 248	61.37 48	23.627 215	22.68 279
June 10.1	62.052 222	06.59 10	39.493 216	60.89 40	23.842 177	25.47 291
20.0	62.274 182	06.49 1	39.709 177	60.49 30	24.019 133	28.38 295
30.0	62.456 138	06.50 6	39.886 136	60.19 19	24.152 87	31.33 289
July 9.9	62.594 92	06.63 13	40.022 90	60.00 9	24.239 40	34.22 278
19.9	62.686 43	06.86 23	40.112 44	59.91 1	24.279 9	37.00 260
29.9	62.729 4	07.17 37	40.156 1	59.92 10	24.270 56	39.60 237
Aug. 8.9	62.725 50	07.54 41	40.155 46	60.02 16	24.214 101	41.97 208
18.9	62.675 91	07.95 41	40.109 85	60.18 21	24.113 141	44.05 176
28.9	62.584 126	08.36 39	40.024 120	60.39 23	23.972 174	45.81 140
Sept. 7.8	62.458 153	08.75 34	39.904 146	60.62 22	23.798 200	47.21 102
17.8	62.305 171	09.09 26	39.758 162	60.84 20	23.598 217	48.23 60
27.8	62.134 177	09.35 18	39.596 170	61.04 17	23.381 225	48.83 19
Oct. 7.7	61.957 173	09.53 8	39.426 166	61.21 12	23.156 222	49.02 25
17.7	61.784 158	09.61 —	39.260 151	61.33 8	22.934 210	48.77 69
27.7	61.626 131	09.58 3	39.109 126	61.41 3	22.724 188	48.08 111
Nov. 6.7	61.495 96	09.46 20	38.983 94	61.44 —	22.536 156	46.97 153
16.6	61.399 55	09.26 26	38.889 55	61.44 2	22.380 119	45.44 191
26.6	61.344 9	09.00 30	38.834 10	61.42 3	22.261 77	43.53 225
Dec. 6.6	61.335 39	08.70 32	38.824 35	61.39 2	22.184 29	41.28 253
16.6	61.374 88	08.38 32	38.859 81	61.37 1	22.155 20	38.75 274
26.5	61.462 134	08.06 32	38.940 126	61.36 0	22.175 67	36.01 286
36.5	61.596	07.74	39.066	61.36	22.242	33.15
Mean Place	59.245	02.06	36.812	55.81	21.650	37.93
Sec δ , Tan δ	1.116	- 0.496	1.073	- 0.388	1.187	+ 0.639
a, a'	+3.7	+4.4	+3.6	+4.6	+2.2	+4.9
b, b'	-0.01	+1.0	-0.01	+1.0	+0.01	+1.0
Authority and Catalogue No.	B.J.	1150	A.N.	1155	B.J.	1157

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name	ε Aquilæ		ζ Sagittarii m.		ζ Aquilæ	
	4·21	Ko	2·71	A2	3·02	Ao
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 18 ^m 56	[°] +14 ['] 58	^h 18 ^m 58	[°] -29 ['] 58	^h 19 ^m 02	[°] +13 ['] 45
Jan. 1·5	27·648 ^s	14·96 ["]	11·462 ^s	59·81 ["]	12·544 ^s	25·74 ["]
11·5	27·762 ¹¹⁴	12·82 ²¹⁴	11·618 ¹⁵⁶	59·27 ⁵⁴	12·654 ¹¹⁰	23·67 ²⁰⁷
21·5	27·913 ¹⁵¹	10·71 ²¹¹	11·816 ¹⁹⁸	58·74 ⁵³	12·801 ¹⁴⁷	21·64 ²⁰³
31·4	28·099 ¹⁸⁶	08·73 ¹⁹⁸	12·050 ²³⁴	58·22 ⁵²	12·981 ¹⁸⁰	19·72 ¹⁹²
Feb. 10·4	28·314 ²¹⁵	06·96 ¹⁷⁷	12·316 ²⁶⁶	57·71 ⁵¹	13·192 ²¹¹	18·00 ¹⁷²
	28·314 ²⁴¹	06·96 ¹⁴⁹		57·71 ⁵²	13·192 ²³⁷	18·00 ¹⁴⁵
20·4	28·555 ²⁶²	05·47 ¹¹⁵	12·607 ³¹³	57·19 ⁵²	13·429 ²⁵⁸	16·55 ¹¹²
Mar. 2·3	28·817 ²⁷⁸	04·32 ⁷⁵	12·920 ³²⁹	56·67 ⁵²	13·687 ²⁷⁶	15·43 ⁷³
12·3	29·095 ²⁹¹	03·57 ³³	13·249 ³⁴²	56·15 ⁵³	13·963 ²⁸⁸	14·70 ³²
22·3	29·386 ³⁰⁰	03·24 ¹¹	13·591 ³⁵⁰	55·62 ⁵³	14·251 ²⁹⁸	14·38 ¹¹
Apr. 1·3	29·686 ³⁰³	03·35 ⁵⁵	13·941 ³⁵⁵	55·09 ⁵²	14·549 ³⁰³	14·49 ⁵⁵
11·2	29·989 ³⁰¹	03·90 ⁹⁵	14·296 ³⁵⁴	54·57 ⁵⁰	14·852 ³⁰²	15·04 ⁹⁴
21·2	30·290 ²⁹⁶	04·85 ¹³¹	14·650 ³⁵⁰	54·07 ⁴⁴	15·154 ²⁹⁷	15·98 ¹³⁰
May 1·2	30·586 ²⁸⁴	06·16 ¹⁶⁴	15·000 ³³⁸	53·63 ³⁸	15·451 ²⁸⁶	17·28 ¹⁶⁰
11·2	30·870 ²⁶⁶	07·80 ¹⁸⁹	15·338 ³²²	53·25 ²⁸	15·737 ²⁷⁰	18·88 ¹⁸⁶
21·1	31·136 ²⁴⁴	09·69 ²⁰⁷	15·660 ²⁹⁹	52·97 ¹⁸	16·007 ²⁴⁹	20·74 ²⁰⁴
31·1	31·380 ²¹⁶	11·76 ²²⁰	15·959 ²⁶⁹	52·79 ⁶	16·256 ²²¹	22·78 ²¹⁶
June 10·1	31·596 ¹⁸³	13·96 ²²⁶	16·228 ²³⁶	52·73 ⁶	16·477 ¹⁸⁹	24·94 ²²²
20·0	31·779 ¹⁴⁶	16·22 ²²⁴	16·464 ¹⁹⁴	52·79 ¹⁹	16·666 ¹⁵²	27·16 ²²⁰
30·0	31·925 ¹⁰⁵	18·46 ²¹⁸	16·658 ¹⁵⁰	52·98 ³²	16·818 ¹¹²	29·36 ²¹⁴
July 9·9	32·030 ⁶³	20·64 ²⁰⁶	16·808 ¹⁰¹	53·30 ⁴¹	16·930 ⁷⁰	31·50 ²⁰³
19·9	32·093 ²⁰	22·70 ¹⁹⁰	16·909 ⁵²	53·71 ⁵⁰	17·000 ²⁶	33·53 ¹⁸⁶
29·9	32·113 ²⁵	24·60 ¹⁷⁰	16·961 ²	54·21 ⁵⁶	17·026 ¹⁸	35·39 ¹⁶⁷
Aug. 8·9	32·088 ⁶⁵	26·30 ¹⁴⁷	16·963 ⁴⁶	54·77 ⁵⁸	17·008 ⁵⁹	37·06 ¹⁴⁴
18·9	32·023 ¹⁰¹	27·77 ¹²¹	16·917 ⁸⁹	55·35 ⁵⁸	16·949 ⁹⁶	38·50 ¹¹⁹
28·9	31·922 ¹³³	28·98 ⁹⁴	16·828 ¹²⁶	55·93 ⁵³	16·853 ¹²⁷	39·69 ⁹³
Sept. 7·8	31·789 ¹⁵⁷	29·92 ⁶⁵	16·702 ¹⁵⁵	56·46 ⁴⁵	16·726 ¹⁵³	40·62 ⁶⁶
17·8	31·632 ¹⁷²	30·57 ³⁵	16·547 ¹⁷⁴	56·91 ³⁵	16·573 ¹⁶⁹	41·28 ³⁶
27·8	31·460 ¹⁷⁹	30·92 ⁵	16·373 ¹⁸³	57·26 ²²	16·404 ¹⁷⁶	41·64 ⁸
Oct. 7·7	31·281 ¹⁷⁶	30·97 ²⁵	16·190 ¹⁸⁰	57·48 ⁹	16·228 ¹⁷⁵	41·72 ²³
17·7	31·105 ¹⁶⁴	30·72 ⁵⁷	16·010 ¹⁶⁵	57·57 ⁵	16·053 ¹⁶³	41·49 ⁵²
27·7	30·941 ¹⁴³	30·15 ⁸⁶	15·845 ¹⁴⁰	57·52 ¹⁹	15·890 ¹⁴³	40·97 ⁸¹
Nov. 6·7	30·798 ¹¹³	29·29 ¹¹⁶	15·705 ¹⁰⁶	57·33 ³⁰	15·747 ¹¹⁴	40·16 ¹⁰⁹
16·6	30·685 ⁷⁸	28·13 ¹⁴³	15·599 ⁶⁴	57·03 ⁴¹	15·633 ⁸⁰	39·07 ¹³⁶
26·6	30·607 ³⁹	26·70 ¹⁶⁷	15·535 ¹⁷	56·62 ⁴⁸	15·553 ⁴¹	37·71 ¹⁵⁹
Dec. 6·6	30·568 ⁴	25·03 ¹⁸⁷	15·518 ³²	56·14 ⁵³	15·512 ¹	36·12 ¹⁷⁹
16·6	30·572 ⁴⁷	23·16 ²⁰²	15·550 ⁸¹	55·61 ⁵⁵	15·513 ⁴⁴	34·33 ¹⁹⁴
26·5	30·619 ⁸⁹	21·14 ²¹⁰	15·631 ¹³⁰	55·06 ⁵⁷	15·557 ⁸⁵	32·39 ²⁰²
36·5	30·708	19·04	15·761	54·49	15·642	30·37
Mean Place	29·368	24·25	13·341	49·29	14·257	34·94
Sec δ. Tan δ	1·035	+0·267	1·154	-0·577	1·030	+0·245
a, a'	+2·7	+4·9	+3·8	+5·0	+2·8	+5·4
b, b'	0·00	+1·0	-0·01	+1·0	0·00	+1·0
Authority and Catalogue No.	A.N.	1158	A.N.	1159	B.J.	1160

APPARENT PLACES OF STARS, 1931.

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AT UPPER TRANSIT AT GREENWICH.

Name	λ Aquilæ		τ Sagittarii		α Coronæ Australis	
	3.55	B9	3.42	Ko	4.12	A2
Mag. Spect.						
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ₁₉ ^m ₀₂	[°] _— ['] _{4 59}	^h ₁₉ ^m ₀₂	[°] _— ['] _{27 46}	^h ₁₉ ^m ₀₄	[°] _— ['] _{38 00}
Jan. 1.5	33.522 ^s	24.48 ["]	36.137 ^s	32.81 ["]	44.780 ^s	59.83 ["]
11.5	33.648 ¹²⁶	25.49 ¹⁰¹	36.286 ¹⁴⁹	32.40 ⁴¹	44.940 ¹⁶⁰	58.78 ¹⁰⁵
21.5	33.810 ¹⁶²	26.48 ⁹⁹	36.475 ¹⁸⁹	32.00 ⁴⁰	45.147 ²⁰⁷	57.74 ¹⁰⁴
31.4	34.004 ¹⁹⁴	27.40 ⁹²	36.700 ²²⁵	31.59 ⁴¹	45.394 ²⁴⁷	56.72 ¹⁰²
Feb. 10.4	34.226 ²²²	28.20 ⁸⁰	36.956 ²⁵⁶	31.16 ⁴³	45.676 ²⁸²	55.74 ⁹⁸
	245	63	282	44	312	92
20.4	34.471 ²⁶⁴	28.83 ⁴²	37.238 ³⁰³	30.72 ⁴⁶	45.988 ³³⁷	54.82 ⁸⁷
Mar. 2.4	34.735 ²⁸¹	29.25 ¹⁹	37.541 ³²¹	30.26 ⁵⁰	46.325 ³⁵⁶	53.95 ⁸¹
12.3	35.016 ²⁹²	29.44 ⁷	37.862 ³³³	29.76 ⁵²	46.681 ³⁷⁰	53.14 ⁷⁴
22.3	35.308 ³⁰¹	29.37 ³²	38.195 ³⁴³	29.24 ⁵⁵	47.051 ³⁸¹	52.40 ⁶⁵
Apr. 1.3	35.609 ³⁰⁶	29.05 ⁵⁷	38.538 ³⁴⁷	28.69 ⁵⁶	47.432 ³⁸⁷	51.75 ⁵⁷
11.2	35.915 ³⁰⁶	28.48 ⁸⁰	38.885 ³⁴⁸	28.13 ⁵⁵	47.819 ³⁸⁷	51.18 ⁴⁵
21.2	36.221 ³⁰²	27.68 ¹⁰⁰	39.233 ³⁴⁴	27.58 ⁵³	48.206 ³⁸³	50.73 ³³
May 1.2	36.523 ²⁹⁴	26.68 ¹¹⁵	39.577 ³³⁴	27.05 ⁴⁸	48.589 ³⁷²	50.40 ¹⁹
11.2	36.817 ²⁷⁹	25.53 ¹²⁶	39.911 ³¹⁸	26.57 ⁴⁰	48.961 ³⁵⁴	50.21 ³
21.1	37.096 ²⁵⁹	24.27 ¹³²	40.229 ²⁹⁶	26.17 ³¹	49.315 ³³⁰	50.18 ¹³
31.1	37.355 ²³⁴	22.95 ¹³⁵	40.525 ²⁶⁸	25.86 ¹⁹	49.645 ²⁹⁸	50.31 ³⁰
June 10.1	37.589 ²⁰³	21.60 ¹³²	40.793 ²³⁵	25.67 ⁸	49.943 ²⁶²	50.61 ⁴⁶
20.1	37.792 ¹⁶⁸	20.28 ¹²⁶	41.028 ¹⁹⁶	25.59 ⁵	50.205 ²¹⁸	51.07 ⁶¹
30.0	37.960 ¹²⁸	19.02 ¹¹⁶	41.224 ¹⁵¹	25.64 ¹⁸	50.423 ¹⁶⁸	51.68 ⁷⁶
July 9.9	38.088 ⁸⁷	17.86 ¹⁰⁴	41.375 ¹⁰⁴	25.82 ²⁸	50.591 ¹¹⁶	52.44 ⁸⁷
19.9	38.175 ⁴³	16.82 ⁹¹	41.479 ⁵⁵	26.10 ³⁸	50.707 ⁶¹	53.31 ⁹⁵
29.9	38.218 [—]	15.91 ⁷⁶	41.534 ⁶	26.48 ⁴⁵	50.768 ⁶	54.26 ⁹⁸
Aug. 8.9	38.218 ⁴²	15.15 ⁶¹	41.540 ⁴¹	26.93 ⁵⁰	50.774 ⁴⁷	55.24 ⁹⁸
18.9	38.176 ⁷⁹	14.54 ⁴⁵	41.499 ⁸³	27.43 ⁵⁰	50.727 ⁹⁵	56.22 ⁹³
28.9	38.097 ¹¹²	14.09 ³¹	41.416 ¹²¹	27.93 ⁴⁸	50.632 ¹³⁶	57.15 ⁸³
Sept. 7.8	37.985 ¹³⁷	13.78 ¹⁸	41.295 ¹⁵⁰	28.41 ⁴²	50.496 ¹⁷⁰	57.98 ⁶⁸
17.8	37.848 ¹⁵⁴	13.60 ⁴	41.145 ¹⁶⁹	28.83 ³⁵	50.326 ¹⁹³	58.66 ⁵¹
27.8	37.694 ¹⁶²	13.56 ⁸	40.976 ¹⁷⁸	29.18 ²⁵	50.133 ²⁰³	59.17 ³¹
Oct. 7.8	37.532 ¹⁵⁹	13.64 ²¹	40.798 ¹⁷⁶	29.43 ¹³	49.930 ²⁰¹	59.48 ⁹
17.7	37.373 ¹⁴⁷	13.85 ³³	40.622 ¹⁶³	29.56 ¹	49.729 ¹⁸⁷	59.57 ¹⁴
27.7	37.226 ¹²⁶	14.18 ⁴⁴	40.459 ¹³⁸	29.57 ¹⁰	49.542 ¹⁶¹	59.43 ³⁶
Nov. 6.7	37.100 ⁹⁷	14.62 ⁵⁶	40.321 ¹⁰⁶	29.47 ²⁰	49.381 ¹²⁵	59.07 ⁵⁶
16.6	37.003 ⁶²	15.18 ⁶⁷	40.215 ⁶⁶	29.27 ²⁹	49.256 ⁸⁰	58.51 ⁷³
26.6	36.941 ²²	15.85 ⁷⁸	40.149 ¹⁹	28.98 ³⁵	49.176 ³⁰	57.78 ⁸⁷
Dec. 6.6	36.919 ¹⁹	16.63 ⁸⁷	40.130 ²⁷	28.63 ⁴⁰	49.146 ²³	56.91 ⁹⁸
16.6	36.938 ⁶²	17.50 ⁹⁵	40.157 ⁷⁵	28.23 ⁴²	49.169 ⁷⁷	55.93 ¹⁰⁴
26.5	37.000 ¹⁰²	18.45 ⁹⁷	40.232 ¹²¹	27.81 ⁴³	49.246 ¹³¹	54.89 ¹⁰⁸
36.5	37.102	19.42	40.353	27.38	49.377	53.81
Mean Place	35.195	14.52	37.975	22.15	46.797	48.87
Sec δ, Tan δ	1.004	—0.087	1.130	—0.527	1.269	—0.782
a, a'	+3.2	+5.4	+3.8	+5.4	+4.1	+5.6
b, b'	0.00	+1.0	—0.01	+1.0	—0.01	+1.0
Authority and Catalogue No.	B.J.	1162	N.A.	1161	B.J.	1163

† Second transit, July 9.

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name	π Sagittarii		ψ Sagittarii		δ Draconis	
	3.02	F2	4.93	F5	3.24	Ko
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 19 05	^m —21 08	^h 19 11	^m —25 22	^h 19 12	^m +67 31
Jan. 1.5	37.912 ^s	15.90 ["]	16.855 ^s	48.35 ["]	28.65 ^s	78.70 ["]
11.5	38.050 ¹³⁸	15.90 ⁰	16.992 ¹³⁷	48.06 ²⁹	28.63 ²	75.20 ³⁵⁰
21.5	38.227 ¹⁷⁷	15.88 ²	17.168 ¹⁷⁶	47.75 ³¹	28.72 ⁹	71.67 ³⁵³
31.4	38.438 ²¹¹	15.84 ⁴	17.380 ²¹²	47.42 ³³	28.91 ¹⁹	68.26 ³⁴¹
Feb. 10.4	38.679 ²⁴¹	15.75 ⁹	17.623 ²⁴³	47.07 ³⁵	29.20 ²⁹	65.09 ³¹⁷
	265 ¹⁵		269 ³⁹		38 ³⁸	282
20.4	38.944 ²⁸⁶	15.60 ²³	17.892 ²⁹¹	46.68 ⁴⁴	29.58 ⁴⁶	62.27 ²³⁵
Mar. 2.4	39.230 ³⁰²	15.37 ³²	18.183 ³⁰⁹	46.24 ⁵⁰	30.04 ⁵³	59.92 ¹⁷⁹
12.3	39.532 ³¹⁵	15.05 ⁴²	18.492 ³²⁴	45.74 ⁵⁵	30.57 ⁵⁷	58.13 ¹¹⁸
22.3	39.847 ³²⁵	14.63 ⁵¹	18.816 ³³⁴	45.19 ⁶¹	31.14 ⁶⁰	56.95 ⁵²
Apr. 1.3	40.172 ³²⁹	14.12 ⁶⁰	19.150 ³⁴⁰	44.58 ⁶⁴	31.74 ⁶¹	56.43 ¹⁴
11.2	40.501 ³³¹	13.52 ⁶⁶	19.490 ³⁴²	43.94 ⁶⁶	32.35 ⁶⁰	56.57 ⁸⁰
21.2	40.832 ³²⁸	12.86 ⁷⁰	19.832 ³³⁹	43.28 ⁶⁵	32.95 ⁵⁸	57.37 ¹⁴⁰
May 1.2	41.160 ³¹⁸	12.16 ⁷⁰	20.171 ³³¹	42.63 ⁶³	33.53 ⁵³	58.77 ¹⁹⁶
11.2	41.478 ³⁰⁵	11.46 ⁶⁹	20.502 ³¹⁸	42.00 ⁵⁶	34.06 ⁴⁸	60.73 ²⁴⁵
21.1	41.783 ²⁸⁴	10.77 ⁶³	20.820 ²⁹⁷	41.44 ⁴⁹	34.54 ⁴¹	63.18 ²⁸⁵
31.1	42.067 ²⁵⁸	10.14 ⁵⁶	21.117 ²⁷⁰	40.95 ³⁸	34.95 ³³	66.03 ³¹⁵
June 10.1	42.325 ²²⁶	09.58 ⁴⁷	21.387 ²³⁸	40.57 ²⁶	35.28 ²⁴	69.18 ³³⁸
20.1	42.551 ¹⁸⁸	09.11 ³⁴	21.625 ¹⁹⁹	40.31 ¹³	35.52 ¹⁴	72.56 ³⁵⁰
30.0	42.739 ¹⁴⁷	08.77 ²³	21.824 ¹⁵⁸	40.18 ¹	35.66 ⁵	76.06 ³⁵⁴
July 10.0	42.886 ¹⁰²	08.54 ¹²	21.982 ¹¹¹	40.17 ¹²	35.71 ⁶	79.60 ³⁴⁸
19.9	42.988 ⁵⁵	08.42 [—]	22.093 ⁶³	40.29 ²²	35.65 ¹⁵	83.08 ³³⁴
29.9	43.043 ⁹	08.42 ⁹	22.156 ¹⁵	40.51 ³²	35.50 ²⁵	86.42 ³¹⁴
Aug. 8.9	43.052 ³⁶	08.51 ¹⁷	22.171 ³²	40.83 ³⁸	35.25 ³⁴	89.56 ²⁸⁵
18.9	43.016 ⁷⁷	08.68 ²³	22.139 ⁷⁵	41.21 ⁴²	34.91 ⁴¹	92.41 ²⁵¹
28.9	42.939 ¹¹³	08.91 ²⁵	22.064 ¹¹²	41.63 ⁴¹	34.50 ⁴⁸	94.92 ²¹²
Sept. 7.8	42.826 ¹⁴¹	09.16 ²⁶	21.952 ¹⁴³	42.04 ³⁹	34.02 ⁵³	97.04 ¹⁶⁷
17.8	42.685 ¹⁵⁹	09.42 ²⁵	21.809 ¹⁶²	42.43 ³⁴	33.49 ⁵⁸	98.71 ¹¹⁹
27.8	42.526 ¹⁶⁹	09.67 ²¹	21.647 ¹⁷³	42.77 ²⁷	32.91 ⁶⁰	99.90 ⁶⁸
Oct. 7.8	42.357 ¹⁶⁷	09.88 ¹⁶	21.474 ¹⁷²	43.04 ¹⁸	32.31 ⁶⁰	100.58 ¹⁵
17.7	42.190 ¹⁵⁴	10.04 ¹²	21.302 ¹⁶¹	43.22 ⁸	31.71 ⁵⁹	100.73 ⁴¹
27.7	42.036 ¹³²	10.16 ⁶	21.141 ¹³⁸	43.30 ²	31.12 ⁵⁷	100.32 ⁹⁵
Nov. 6.7	41.904 ¹⁰¹	10.22 ³	21.003 ¹⁰⁸	43.28 ⁹	30.55 ⁵²	99.37 ¹⁴⁹
16.6	41.803 ⁶³	10.25 [—]	20.895 ⁷⁰	43.19 ¹⁷	30.03 ⁴⁵	97.88 ²⁰¹
26.6	41.740 ²¹	10.25 ²	20.825 ²⁶	43.02 ²³	29.58 ³⁸	95.87 ²⁴⁸
Dec. 6.6	41.719 ²⁴	10.23 ³	20.799 ¹⁸	42.79 ²⁷	29.20 ²⁹	93.39 ²⁸⁷
16.6	41.743 ⁶⁹	10.20 ³	20.817 ⁶⁵	42.52 ²⁹	28.91 ²⁰	90.52 ³¹⁹
26.5	41.812 ¹¹⁴	10.17 ³	20.882 ¹¹¹	42.23 ³¹	28.71 ⁹	87.33 ³⁴⁰
36.5	41.926	10.14 ³	20.993	41.92	28.62	83.93
Mean Place	39.668	05.33	18.645	37.43	32.583	84.67
Sec δ , Tan δ	1.072	—0.387	1.107	—0.474	2.618	+2.419
a, a'	+3.6	+5.7	+3.7	+6.1	0.0	+6.2
b, b'	—0.01	+1.0	—0.01	+1.0	+0.05	+1.0
Authority and Catalogue No.	B.J.	1166	N.A.	1172	B.J.	1173

† Second transit, July 9.

† First transit, July 10.

APPARENT PLACES OF STARS, 1931.

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AT UPPER TRANSIT AT GREENWICH.

Name	♌ Aquilæ		♐ Aquilæ		♑ G Telescopii	
	5.14	A5	3.44	Fo	5.58	K2
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 19	^m 14	^h 19	^m 21	^h 19	^m 22
		^s +11		^s 2		^s -54
Jan. 1.5	32.893	62.22	59.478	23.89	13.542	66.09
11.5	32.992	60.32	59.579	22.48	13.705	64.03
21.5	33.129	58.44	59.715	21.10	13.932	61.97
31.4	33.299	56.67	59.885	19.80	14.217	59.95
Feb. 10.4	33.500	55.07	60.084	18.65	14.555	58.03
20.4	33.727	53.72	60.309	17.70	14.937	56.23
Mar. 2.4	33.977	52.69	60.556	17.01	15.358	54.60
12.3	34.246	52.01	60.822	16.62	15.810	53.14
22.3	34.529	51.73	61.103	16.54	16.287	51.91
Apr. 1.3	34.823	51.86	61.395	16.80	16.781	50.89
11.3	35.124	52.39	61.695	17.39	17.286	50.13
21.2	35.427	53.31	61.999	18.28	17.795	49.64
May 1.2	35.727	54.57	62.302	19.45	18.300	49.42
11.2	36.018	56.13	62.598	20.84	18.792	49.49
21.1	36.296	57.92	62.882	22.41	19.263	49.85
31.1	36.553	59.90	63.148	24.11	19.703	50.49
June 10.1	36.785	61.99	63.390	25.87	20.103	51.41
20.1	36.986	64.13	63.603	27.65	20.454	52.58
30.0	37.151	66.27	63.781	29.40	20.748	53.97
July 10.0	37.276	68.34	63.921	31.07	20.977	55.54
19.9	37.360	70.30	64.019	32.61	21.138	57.25
29.9	37.399	72.11	64.074	34.01	21.225	59.03
Aug. 8.9	37.395	73.73	64.085	35.24	21.240	60.83
18.9	37.349	75.13	64.054	36.28	21.183	62.58
28.9	37.265	76.30	63.984	37.12	21.060	64.20
Sept. 7.8	37.147	77.21	63.880	37.77	20.878	65.65
17.8	37.004	77.86	63.749	38.21	20.647	66.84
27.8	36.842	78.25	63.599	38.44	20.382	67.73
Oct. 7.8	36.671	78.37	63.438	38.47	20.097	68.27
17.7	36.500	78.21	63.276	38.30	19.807	68.44
27.7	36.338	77.77	63.123	37.95	19.530	68.22
Nov. 6.7	36.195	77.06	62.987	37.40	19.280	67.62
16.7	36.079	76.09	62.878	36.66	19.072	66.65
26.6	35.995	74.87	62.799	35.75	18.919	65.36
Dec. 6.6	35.948	73.43	62.757	34.68	18.828	63.79
16.6	35.941	71.80	62.755	33.47	18.806	61.99
26.5	35.976	70.03	62.792	32.16	18.855	60.03
36.5	36.052	68.17	62.869	30.79	18.975	57.98
Mean Place	34.588	71.29	61.135	33.41	16.070	53.73
Sec δ, Tan δ	1.020	+0.203	1.001	+0.052	1.721	-1.400
a, a'	+2.8	+6.4	+3.0	+7.0	+4.8	+7.0
b, b'	0.00	+0.9	0.00	+0.9	-0.03	+0.9
Authority and Catalogue No.	B.J.	1177	B.J.	1185	N.A.	1186

AT UPPER TRANSIT AT GREENWICH.

Name	6 Vulpeculæ		β^1 Cygni		μ Aquilæ	
	4.63	Ma	3.24	Ko—Ao	4.65	Ko
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 19 ^m 25	[°] +24 ['] 31	^h 19 ^m 27	[°] +27 ['] 48	^h 19 ^m 30	[°] +7 ['] 13
Jan. 1.5	48.144 ^s	18.88	54.381 ^s	41.71	41.395 ^s	43.48
11.5	48.217 ^s	16.39	54.448 ^s	39.10	41.482 ^s	41.85
21.5	48.331 ^s	13.91	54.558 ^s	36.48	41.606 ^s	40.25
31.5	48.484 ^s	11.52	54.707 ^s	33.96	41.764 ^s	38.73
Feb. 10.4	48.672 ^s	09.34	54.893 ^s	31.65	41.952 ^s	37.37
20.4	48.890 ^s	07.45	55.112 ^s	29.63	42.168 ^s	36.23
Mar. 2.4	49.137 ^s	05.92	55.359 ^s	27.99	42.407 ^s	35.37
12.3	49.406 ^s	04.83	55.631 ^s	26.80	42.667 ^s	34.84
22.3	49.694 ^s	04.23	55.923 ^s	26.10	42.943 ^s	34.65
Apr. 1.3	49.996 ^s	04.11	56.230 ^s	25.93	43.233 ^s	34.84
11.3	50.308 ^s	04.51	56.547 ^s	26.28	43.533 ^s	35.30
21.2	50.622 ^s	05.39	56.867 ^s	27.15	43.836 ^s	36.28
May 1.2	50.934 ^s	06.72	57.184 ^s	28.49	44.140 ^s	37.49
11.2	51.238 ^s	08.46	57.493 ^s	30.25	44.438 ^s	38.96
21.2	51.526 ^s	10.53	57.786 ^s	32.38	44.724 ^s	40.65
31.1	51.793 ^s	12.87	58.057 ^s	34.79	44.993 ^s	42.50
June 10.1	52.033 ^s	15.40	58.300 ^s	37.42	45.239 ^s	44.44
20.1	52.239 ^s	18.05	58.508 ^s	40.19	45.456 ^s	46.43
30.0	52.406 ^s	20.75	58.676 ^s	43.02	45.638 ^s	48.39
July 10.0	52.532 ^s	23.43	58.802 ^s	45.82	45.781 ^s	50.29
19.9	52.612 ^s	26.01	58.882 ^s	48.54	45.884 ^s	52.09
29.9	52.646 ^s	28.45	58.914 ^s	51.13	45.943 ^s	53.73
Aug. 8.9	52.635 ^s	30.70	58.899 ^s	53.52	45.958 ^s	55.20
18.9	52.579 ^s	32.69	58.839 ^s	55.66	45.930 ^s	56.47
28.9	52.482 ^s	34.42	58.737 ^s	57.51	45.863 ^s	57.52
Sept. 7.9	52.350 ^s	35.82	58.599 ^s	59.04	45.761 ^s	58.35
17.8	52.190 ^s	36.90	58.431 ^s	60.22	45.631 ^s	58.94
27.8	52.008 ^s	37.62	58.242 ^s	61.03	45.481 ^s	59.30
Oct. 7.8	51.815 ^s	37.98	58.040 ^s	61.45	45.319 ^s	59.42
17.7	51.619 ^s	37.96	57.836 ^s	61.47	45.154 ^s	59.30
27.7	51.431 ^s	37.55	57.639 ^s	61.09	44.997 ^s	58.94
Nov. 6.7	51.260 ^s	36.77	57.458 ^s	60.31	44.856 ^s	58.35
16.7	51.113 ^s	35.62	57.301 ^s	59.13	44.738 ^s	57.54
26.6	50.997 ^s	34.12	57.177 ^s	57.59	44.651 ^s	56.52
Dec. 6.6	50.919 ^s	32.31	57.089 ^s	55.71	44.598 ^s	55.30
16.6	50.882 ^s	30.23	57.043 ^s	53.54	44.584 ^s	53.92
26.6	50.886 ^s	27.94	57.040 ^s	51.15	44.609 ^s	52.42
36.5	50.934 ^s	25.52	57.081 ^s	48.61	44.673 ^s	50.84
Mean Place	49.955	26.68	56.238	49.16	43.056	52.56
Sec δ , Tan δ	1.099	+0.457	1.131	+0.528	1.008	+0.127
a, a'	+2.5	+7.3	+2.4	+7.5	+2.9	+7.7
b, b'	+0.01	+0.9	+0.01	+0.9	0.00	+0.9
Authority and Catalogue No.	N.A.	1190	B.J.	1193	N.A.	1197

APPARENT PLACES OF STARS, 1931.

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AT UPPER TRANSIT AT GREENWICH.

Name	h Sagittarii		54 Sagittarii		f Sagittarii	
	4.66	B9	5.45	Ko	5.06	Ko
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 19 32	^m —25 02	^h 19 36	^m —16 27	^h 19 42	^m —19 55
Jan. 1.5	28.872 ⁸	25.76 ³³	44.620 ¹⁰²	20.68 ²⁰	18.644 ⁹⁸	53.46 ⁴
11.5	28.986 ¹¹⁴	25.43 ³⁷	44.722 ¹³⁹	20.88 ¹⁶	18.742 ¹³⁶	53.42 ⁷
21.5	29.140 ¹⁵⁴	25.06 ⁴¹	44.861 ¹⁷⁴	21.04 ⁹	18.878 ¹⁷²	53.35 ¹⁴
31.5	29.330 ¹⁹⁰	24.65 ⁴⁵	45.035 ²⁰³	21.13 ²	19.050 ²⁰²	53.21 ²¹
Feb. 10.4	29.551 ²²¹	24.20 ⁵¹	45.238 ²³²	21.15 ⁹	19.252 ²³¹	53.00 ³⁰
20.4	29.801 ²⁵⁰	23.69 ⁵⁸	45.470 ²⁵⁵	21.06 ²²	19.483 ²⁵⁶	52.70 ⁴¹
Mar. 2.4	30.075 ²⁷⁴	23.11 ⁶⁴	45.725 ²⁷⁴	20.84 ³⁶	19.739 ²⁷⁷	52.29 ⁵²
12.3	30.369 ²⁹⁴	22.47 ⁷¹	45.999 ²⁹³	20.48 ⁵⁰	20.016 ²⁹⁶	51.77 ⁶⁴
22.3	30.681 ³¹²	21.76 ⁷⁷	46.292 ³⁰⁷	19.98 ⁶⁵	20.312 ³¹⁰	51.13 ⁷⁵
Apr. 1.3	31.007 ³²⁶	20.99 ⁸²	46.599 ³¹⁶	19.33 ⁷⁹	20.622 ³²¹	50.38 ⁸⁵
11.3	31.343 ³⁴¹	20.17 ⁸⁴	46.915 ³²³	18.54 ⁸⁹	20.943 ³²⁹	49.53 ⁹²
21.2	31.684 ³⁴²	19.33 ⁸³	47.238 ³²⁵	17.65 ⁹⁸	21.272 ³³¹	48.61 ⁹⁷
May 1.2	32.026 ³³⁸	18.50 ⁸⁰	47.563 ³²⁰	16.67 ¹⁰³	21.603 ³²⁹	47.64 ⁹⁹
11.2	32.364 ³²⁷	17.70 ⁷⁴	47.883 ³¹¹	15.64 ¹⁰⁵	21.932 ³¹⁹	46.65 ⁹⁷
21.2	32.691 ³⁰⁹	16.96 ⁶⁵	48.194 ²⁹⁵	14.59 ¹⁰¹	22.251 ³⁰⁴	45.68 ⁹²
31.1	33.000 ²⁸⁶	16.31 ⁵⁴	48.489 ²⁷²	13.58 ⁹⁶	22.555 ²⁸²	44.76 ⁸³
June 10.1	33.286 ²⁵⁶	15.77 ⁴⁰	48.761 ²⁴⁵	12.62 ⁸⁷	22.837 ²⁵³	43.93 ⁷²
20.1	33.542 ²¹⁸	15.37 ²⁷	49.006 ²¹⁰	11.75 ⁷⁵	23.090 ²¹⁹	43.21 ⁵⁹
30.0	33.760 ¹⁷⁷	15.10 ¹¹	49.216 ¹⁷⁰	11.00 ⁶³	23.309 ¹⁸⁰	42.62 ⁴⁴
July 10.0	33.937 ¹³²	14.99 ⁴	49.386 ¹²⁸	10.37 ⁴⁸	23.489 ¹³⁵	42.18 ³⁰
19.9	34.069 ⁸⁴	15.03 ¹⁷	49.514 ⁸²	09.89 ³⁴	23.624 ⁹⁰	41.88 ¹⁵
29.9	34.153 ³⁵	15.20 ²⁹	49.596 ³⁶	09.55 ²¹	23.714 ⁴²	41.73 ¹
Aug. 8.9	34.188 ¹³	15.49 ³⁸	49.632 ¹⁰	09.34 ⁷	23.756 ⁴	41.72 ¹¹
18.9	34.175 ⁵⁸	15.87 ⁴⁴	49.622 ⁵²	09.27 ¹³	23.752 ⁴⁸	41.83 ²¹
28.9	34.117 ⁹⁷	16.31 ⁴⁶	49.570 ⁸⁹	09.30 ³	23.704 ⁸⁸	42.04 ²⁷
Sept. 7.9	34.020 ¹³⁰	16.77 ⁴⁶	49.481 ¹²²	09.43 ¹⁸	23.616 ¹²⁰	42.31 ³²
17.8	33.890 ¹⁵⁵	17.23 ⁴²	49.359 ¹⁴³	09.61 ²³	23.496 ¹⁴⁴	42.63 ³³
27.8	33.735 ¹⁶⁸	17.65 ³⁶	49.216 ¹⁵⁸	09.84 ²⁵	23.352 ¹⁵⁹	42.96 ³³
Oct. 7.8	33.567 ¹⁷¹	18.01 ²⁸	49.058 ¹⁶¹	10.09 ²⁷	23.193 ¹⁶⁴	43.29 ³⁰
17.7	33.396 ¹⁶⁴	18.29 ¹⁸	48.897 ¹⁵⁴	10.36 ²⁵	23.029 ¹⁵⁸	43.59 ²⁵
27.7	33.232 ¹⁴⁵	18.47 ⁸	48.743 ¹³⁷	10.61 ²⁵	22.871 ¹⁴²	43.84 ²¹
Nov. 6.7	33.087 ¹¹⁹	18.55 ²	48.606 ¹¹⁴	10.86 ²³	22.729 ¹¹⁹	44.05 ¹⁵
16.7	32.968 ⁸⁴	18.53 ¹⁰	48.492 ⁸²	11.09 ²²	22.610 ⁸⁷	44.20 ¹¹
26.6	32.884 ⁴⁴	18.43 ¹⁸	48.410 ⁴⁴	11.31 ²²	22.523 ⁴⁹	44.31 ⁷
Dec. 6.6	32.840 [—]	18.25 ²⁵	48.366 ⁵	11.53 ²¹	22.474 ¹⁰	44.38 ³
16.6	32.840 [—]	18.00 ²⁹	48.361 ³⁷	11.74 ²⁰	22.464 ³³	44.41 [—]
26.6	32.884 ⁴⁴	17.71 ³⁴	48.398 ⁷⁷	11.94 ¹⁹	22.497 ⁷³	44.41 ⁴
36.5	32.971 ⁸⁷	17.37 [—]	48.475 [—]	12.13 [—]	22.570 [—]	44.37 [—]
Mean Place	30.608	14.16	46.280	09.60	20.310	41.98
Sec δ, Tan δ	1.104	—0.467	1.043	—0.295	1.064	—0.363
a, a'	+3.6	+7.9	+3.4	+8.2	+3.5	+8.7
b, b'	—0.01	+0.9	—0.01	+0.9	—0.01	+0.9
Authority and Catalogue No.	B.J.	1198	N.A.	1203	N.A.	1211

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name	δ Cygni			γ Aquilæ			α Aquilæ (<i>Altair</i>)		
	Mag. Spect.		Ao	2.80		K2	0.89		A5
Mean Solar Date	R.A.		Dec.	R.A.		Dec.	R.A.		Dec.
	^h 19	^m 42	^u +44 ^v 57	^h 19	^m 42	^u +10 ^v 26	^h 19	^m 47	^u +8 ^v 40
Jan. 1.5	46.748	18	36.50	57.053	73	29.82	23.324	73	57.19
11.5	46.766	72	33.40	57.126	110	28.07	23.397	110	55.56
21.5	46.838	125	30.25	57.236	143	26.33	23.507	143	53.94
31.5	46.963	176	27.16	57.379	175	24.67	23.650	176	52.41
Feb. 10.4	47.139	221	24.25	57.554	204	23.17	23.826	203	51.03
20.4	47.360	264	21.64	57.758	229	21.90	24.029	229	49.87
Mar. 2.4	47.624	300	19.44	57.987	251	20.91	24.258	250	48.99
12.4	47.924	329	17.72	58.238	271	20.26	24.508	270	48.43
22.3	48.253	352	16.55	58.509	285	19.99	24.778	286	48.24
Apr. 1.3	48.605	367	15.99	58.794	297	20.11	25.064	297	48.42
11.3	48.972	373	16.04	59.091	304	20.61	25.361	304	48.98
21.2	49.345	371	16.69	59.395	306	21.50	25.665	306	49.89
May 1.2	49.716	359	17.92	59.701	301	22.73	25.971	303	51.15
11.2	50.075	340	19.67	60.002	292	24.26	26.274	293	52.68
21.2	50.415	312	21.90	60.294	276	26.03	26.567	279	54.44
31.1	50.727	276	24.52	60.570	252	27.99	26.846	255	56.37
June 10.1	51.003	234	27.44	60.822	224	30.08	27.101	228	58.41
20.1	51.237	184	30.59	61.046	191	32.23	27.329	194	60.51
30.1	51.421	131	33.89	61.237	153	34.38	27.523	157	62.60
July 10.0	51.552	76	37.22	61.390	110	36.48	27.680	115	64.63
19.9	51.628	19	40.53	61.500	67	38.48	27.795†	71	66.56
29.9	51.647	39	43.73	61.567	23	40.33	27.866	28	68.36
Aug. 8.9	51.608	92	46.75	61.590	21	42.01	27.894	16	69.96
18.9	51.516	143	49.53	61.569	61	43.48	27.878	92	71.36
28.9	51.373	188	52.01	61.508	97	44.72	27.821	92	72.53
Sept. 7.9	51.185	224	54.14	61.411	127	45.71	27.729	123	73.47
17.8	50.961	253	55.87	61.284	149	46.46	27.606	145	74.18
27.8	50.708	271	57.17	61.135	162	46.95	27.461	158	74.62
Oct. 7.8	50.437	278	58.02	60.973	167	47.17	27.303	163	74.82
17.8	50.159	275	58.38	60.806	161	47.13	27.140	159	74.77
27.7	49.884	261	58.24	60.645	148	46.83	26.981	145	74.49
Nov. 6.7	49.623	238	57.60	60.497	126	46.27	26.836	123	73.95
16.7	49.385	204	56.46	60.371	98	45.46	26.713	95	73.18
26.6	49.181	165	54.85	60.273	65	44.41	26.618	63	72.19
Dec. 6.6	49.016	118	52.79	60.208	27	43.14	26.555	26	71.00
16.6	48.898	68	50.35	60.181	11	41.68	26.529	13	69.65
26.6	48.830	14	47.59	60.192	50	40.08	26.542	50	68.16
36.5	48.816		44.60	60.242		38.39	26.592		66.57
Mean Place	49.020		41.63	58.718		38.36	24.975		65.92
Sec δ , Tan δ	1.413		+0.999	1.017		+0.184	1.012		+0.153
a, a'	+1.9		+8.7	+2.9		+8.7	+2.9		+9.1
b, b'	+0.03		+0.9	+0.01		+0.9	0.00		+0.9
Authority and Catalogue No.	B.J.		1213	B.J.		1214	A.E.		1218

No. 1218 corrected for a parallax of 0".20.

† First transit, July 20.

APPARENT PLACES OF STARS, 1931.

491

AT UPPER TRANSIT AT GREENWICH.

Name	ε Draconis		ι Sagittarii		β Aquilæ	
	4°03	Ko	4°21	Ko	3°90	Ko
Mag. Spect.						
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 19 ^m 48	[°] +70 ['] 05	^h 19 ^m 50	[°] -42 ['] 03	^h 19 ^m 51	[°] +6 ['] 13
Jan. 1°5	20°41	29°46	28°426	17°12	53°771	50°90
11°5	20°27	26°13	28°530	15°71	53°839	49°39
21°5	20°25	22°68	28°684	14°23	53°943	47°90
31°5	20°35	19°24	28°884	12°72	54°081	46°49
Feb. 10°4	20°57	15°94	29°124	11°20	54°250	45°22
20°4	20°90	12°91	29°403	09°70	54°447	44°15
Mar. 2°4	21°33	10°26	29°713	08°24	54°670	43°34
12°4	21°84	08°10	30°051	06°83	54°916	42°84
22°3	22°43	06°51	30°414	05°51	55°182	42°68
Apr. 1°3	23°07	05°54	30°796	04°29	55°463	42°88
11°3	23°74	05°22	31°193	03°19	55°758	43°43
21°2	24°41	05°55	31°600	02°24	56°061	44°32
May 1°2	25°07	06°52	32°010	01°46	56°367	45°52
11°2	25°71	08°08	32°418	00°88	56°671	46°98
21°2	26°29	10°18	32°815	00°52	56°967	48°66
31°1	26°81	12°75	33°193	00°38	57°248	50°50
June 10°1	27°25	15°69	33°545	00°48	57°509	52°43
20°1	27°59	18°93	33°863	00°81	57°742	54°41
30°1	27°83	22°39	34°138	01°38	57°943	56°37
July 10°0	27°96	25°96	34°365	02°15	58°107	58°27
20°0	27°98†	29°55	34°539†	03°11	58°230	60°07
29°9	27°89	33°09	34°655	04°21	58°309	61°72
Aug. 8°9	27°69	36°50	34°712	05°41	58°343	63°20
18°9	27°39	39°69	34°710	06°67	58°334	64°48
28°9	27°00	42°61	34°653	07°92	58°285	65°55
Sept. 7°9	26°52	45°19	34°545	09°12	58°198	66°39
17°8	25°97	47°37	34°395	10°20	58°081	67°01
27°8	25°36	49°11	34°212	11°11	57°941	67°40
Oct. 7°8	24°72	50°37	34°007	11°80	57°786	67°56
17°8	24°05	51°10	33°793	12°25	57°626	67°49
27°7	23°38	51°29	33°583	12°42	57°469	67°20
Nov. 6°7	22°72	50°92	33°390	12°31	57°324	66°69
16°7	22°10	49°98	33°224	11°92	57°200	65°97
26°6	21°53	48°49	33°097	11°27	57°103	65°05
Dec. 6°6	21°03	46°48	33°014	10°39	57°039	63°95
16°6	20°61	44°01	32°982	09°30	57°010	62°69
26°6	20°29	41°14	33°001	08°04	57°017	61°31
36°5	20°08	37°97	33°073	06°66	57°063	59°86
Mean Place	24°872	32°23	30°366	03°65	55°398	59°72
Sec δ, Tan δ	2°937	+2°761	1°347	-0°902	1°006	+0°109
a, a'	-0°2	+9°1	+4°1	+9°3	+2°9	+9°4
b, b'	+0°08	+0°9	-0°03	+0°9	0°00	+0°9
Authority and Catalogue No.	B.J.	1219	N.A.	1221	B.J.	1222

† First transit, July 20.

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name	ε Pavonis		g Sagittarii		c Sagittarii	
	4.10	Ao	5.05	Ao	4.60	Mb
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ₁₉ ^m ₅₂	[°] _{—73} ['] ₀₅	^h ₁₉ ^m ₅₄	[°] _{—15} ['] ₄₀	^h ₁₉ ^m ₅₈	[°] _{—27} ['] ₅₄
Jan. 1.6	^s _{34.31}	["] _{58.18}	^s _{00.683}	["] _{44.25}	^s _{23.399}	["] _{23.32}
11.5	_{34.43} ₁₂	_{55.19} ₂₉₉	_{00.767} ₈₄	_{44.45} ₂₀	_{23.486} ₈₇	_{22.76} ₅₆
21.5	_{34.69} ₂₆	_{52.15} ₃₀₄	_{00.887} ₁₂₀	_{44.60} ₁₅	_{23.613} ₁₂₇	_{22.12} ₆₄
31.5	_{35.08} ₃₉	_{49.14} ₃₀₁	_{01.042} ₁₅₅	_{44.68} ₈	_{23.778} ₁₆₅	_{21.42} ₇₀
Feb. 10.4	_{35.59} ₅₁	_{46.23} ₂₉₁	_{01.227} ₁₈₅	_{44.67} ₁	_{23.977} ₁₉₉	_{20.66} ₇₆
	₆₁	₂₇₅	₂₁₅	₁₂	₂₃₀	₈₃
20.4	_{36.20} ₇₀	_{43.48} ₂₅₁	_{01.442} ₂₃₉	_{44.55} ₂₇	_{24.207} ₂₅₇	_{19.83} ₈₈
Mar. 2.4	_{36.90} ₇₉	_{40.97} ₂₂₅	_{01.681} ₂₆₂	_{44.28} ₄₂	_{24.464} ₂₈₂	_{18.95} ₉₄
12.4	_{37.69} ₈₄	_{38.72} ₁₉₂	_{01.943} ₂₈₂	_{43.86} ₅₈	_{24.746} ₃₀₄	_{18.01} ₁₀₀
22.3	_{38.53} ₈₉	_{36.80} ₁₅₇	_{02.225} ₂₉₉	_{43.29} ₇₄	_{25.050} ₃₂₃	_{17.01} ₁₀₄
Apr. 1.3	_{39.42} ₉₃	_{35.23} ₁₁₉	_{02.524} ₃₁₁	_{42.55} ₈₇	_{25.373} ₃₃₆	_{15.97} ₁₀₅
11.3	_{40.35} ₉₄	_{34.04} ₇₈	_{02.835} ₃₂₀	_{41.68} ₁₀₀	_{25.709} ₃₄₇	_{14.92} ₁₀₅
21.3	_{41.29} ₉₅	_{33.26} ₃₇	_{03.155} ₃₂₄	_{40.68} ₁₀₈	_{26.056} ₃₅₂	_{13.87} ₁₀₂
May 1.2	_{42.24} ₉₃	_{32.89} ₇	_{03.479} ₃₂₄	_{39.60} ₁₁₅	_{26.408} ₃₅₁	_{12.85} ₉₅
11.2	_{43.17} ₈₉	_{32.96} ₄₉	_{03.803} ₃₁₆	_{38.45} ₁₁₆	_{26.759} ₃₄₄	_{11.90} ₈₅
21.2	_{44.06} ₈₄	_{33.45} ₉₀	_{04.119} ₃₀₂	_{37.29} ₁₁₄	_{27.103} ₃₃₁	_{11.05} ₇₄
31.1	_{44.90} ₇₇	_{34.35} ₁₃₀	_{04.421} ₂₈₃	_{36.15} ₁₀₉	_{27.434} ₃₁₀	_{10.31} ₅₉
June 10.1	_{45.67} ₆₈	_{35.65} ₁₆₆	_{04.704} ₂₅₆	_{35.06} ₉₉	_{27.744} ₂₈₁	_{09.72} ₄₂
20.1	_{46.35} ₅₇	_{37.31} ₁₉₈	_{04.960} ₂₂₃	_{34.07} ₈₈	_{28.025} ₂₄₇	_{09.30} ₂₄
30.1	_{46.92} ₄₆	_{39.29} ₂₂₃	_{05.183} ₁₈₅	_{33.19} ₇₃	_{28.272} ₂₀₆	_{09.06} ₆
July 10.0	_{47.38} ₃₂	_{41.52} ₂₄₂	_{05.368} ₁₄₃	_{32.46} ₅₈	_{28.478} ₁₆₁	_{09.00} ₁₂
20.0	_{47.70} ₁₉	_{43.94} ₂₅₄	_{05.511} ₉₈	_{31.88} ₄₃	_{28.639} ₁₁₂	_{09.12} ₂₈
29.9	_{47.89} ₄	_{46.48} ₂₅₈	_{05.609} ₅₁	_{31.45} ₂₇	_{28.751} ₆₁	_{09.40} ₄₂
Aug. 8.9	_{47.93} ₉	_{49.06} ₂₅₃	_{05.660} ₆	_{31.18} ₁₃	_{28.812} ₁₁	_{09.82} ₅₃
18.9	_{47.84} ₂₃	_{51.59} ₂₃₈	_{05.666} ₃₈	_{31.05} ₉	_{28.823} ₃₆	_{10.35} ₆₁
28.9	_{47.61} ₃₅	_{53.97} ₂₁₅	_{05.628} ₇₈	_{31.05} ₉	_{28.787} ₇₉	_{10.96} ₆₅
Sept. 7.9	_{47.26} ₄₆	_{56.12} ₁₈₃	_{05.550} ₁₁₀	_{31.14} ₁₈	_{28.708} ₁₁₇	_{11.61} ₆₄
17.8	_{46.80} ₅₅	_{57.95} ₁₄₃	_{05.440} ₁₃₅	_{31.32} ₂₆	_{28.591} ₁₄₅	_{12.25} ₆₀
27.8	_{46.25} ₆₀	_{59.38} ₉₇	_{05.305} ₁₅₁	_{31.58} ₂₈	_{28.446} ₁₆₄	_{12.85} ₅₃
Oct. 7.8	_{45.65} ₆₃	_{60.35} ₄₆	_{05.154} ₁₅₈	_{31.86} ₃₀	_{28.282} ₁₇₂	_{13.38} ₄₂
17.8	_{45.02} ₆₄	_{60.81} ₈	_{04.996} ₁₅₅	_{32.16} ₃₀	_{28.110} ₁₆₉	_{13.80} ₂₉
27.7	_{44.38} ₆₀	_{60.73} ₆₂	_{04.841} ₁₄₁	_{32.46} ₂₉	_{27.941} ₁₅₆	_{14.09} ₁₆
Nov. 6.7	_{43.78} ₅₅	_{60.11} ₁₁₅	_{04.700} ₁₂₀	_{32.75} ₂₉	_{27.785} ₁₃₄	_{14.25} ₂
16.7	_{43.23} ₄₆	_{58.96} ₁₆₄	_{04.580} ₉₁	_{33.04} ₂₇	_{27.651} ₁₀₃	_{14.27} ₁₂
26.7	_{42.77} ₃₅	_{57.32} ₂₀₈	_{04.489} ₅₆	_{33.31} ₂₆	_{27.548} ₆₆	_{14.15} ₂₅
Dec. 6.6	_{42.42} ₂₃	_{55.24} ₂₄₄	_{04.433} ₁₉	_{33.57} ₂₄	_{27.482} ₂₅	_{13.90} ₃₇
16.6	_{42.19} ₁₀	_{52.80} ₂₇₃	_{04.414} ₂₀	_{33.81} ₂₃	_{27.457} ₁₇	_{13.53} ₄₆
26.6	_{42.09} ₄	_{50.07} ₂₉₃	_{04.434} ₆₀	_{34.04} ₂₀	_{27.474} ₆₁	_{13.07} ₅₄
36.5	_{42.13}	_{47.14}	_{04.494}	_{34.24}	_{27.535}	_{12.53}
Mean Place	38.618	43.36	02.296	32.97	25.082	10.69
Sec δ, Tan δ	3.439	—3.290	1.039	—0.281	1.132	—0.530
a, a'	+6.9	+9.5	+3.4	+9.6	+3.7	+9.9
b, b'	—0.10	+0.9	—0.01	+0.9	—0.02	+0.9
Authority and Catalogue No.	B. J.	1223	N. A.	1227	A. N.	1231

APPARENT PLACES OF STARS, 1931.

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AT UPPER TRANSIT AT GREENWICH.

Name	δ Pavonis		θ Aquilæ		4 Capricorni	
	3.64	G5	3.37	Ao	5.96	Ko
Mag. Spect.						
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 20 ^m OI	[°] —66 ['] 21	^h 20 ^m 07	[°] —1 ['] OI	^h 20 ^m 13	[°] —22 ['] OI
Jan. 1.6	55.37	51.59	43.123	47.82	56.717	40.42
11.5	55.47	48.92	43.183	48.86	56.784	40.19
21.5	55.67	46.16	43.278	49.87	56.889	39.89
31.5	55.95	43.40	43.406	50.80	57.029	39.49
Feb. 10.5	56.32	40.69	43.565	51.61	57.203	39.02
20.4	56.77	38.10	43.752	52.24	57.407	38.44
Mar. 2.4	57.28	35.68	43.966	52.65	57.639	37.75
12.4	57.85	33.48	44.203	52.81	57.896	36.95
22.3	58.47	31.55	44.462	52.69	58.176	36.04
Apr. 1.3	59.13	29.92	44.739	52.27	58.476	35.03
11.3	59.82	28.61	45.031	51.56	58.792	33.93
21.3	60.52	27.66	45.334	50.59	59.121	32.78
May 1.2	61.23	27.08	45.643	49.38	59.457	31.61
11.2	61.93	26.90	45.953	47.97	59.796	30.44
21.2	62.61	27.11	46.257	46.40	60.130	29.30
31.2	63.26	27.71	46.550	44.73	60.454	28.25
June 10.1	63.86	28.69	46.825	43.01	60.760	27.31
20.1	64.40	30.03	47.075	41.29	61.040	26.51
30.1	64.87	31.67	47.293	39.61	61.289	25.87
July 10.0	65.25	33.60	47.476	38.02	61.500	25.41
20.0	65.53	35.75	47.619	36.55	61.668	25.13
29.9	65.72	38.04	47.718	35.24	61.790	25.02
Aug. 8.9	65.80	40.41	47.773	34.10	61.864	25.07
18.9	65.77	42.77	47.783	33.14	61.890	25.28
28.9	65.65	45.04	47.752	32.37	61.869	25.61
Sept. 7.9	65.43	47.13	47.682	31.79	61.806	26.02
17.9	65.13	48.95	47.580	31.40	61.706	26.48
27.8	64.77	50.43	47.453	31.19	61.577	26.97
Oct. 7.8	64.36	51.50	47.308	31.14	61.427	27.44
17.8	63.93	52.12	47.156	31.26	61.268	27.88
27.7	63.49	52.26	47.005	31.53	61.108	28.25
Nov. 6.7	63.07	51.90	46.863	31.95	60.958	28.54
16.7	62.70	51.04	46.740	32.50	60.827	28.75
26.7	62.38	49.72	46.642	33.18	60.723	28.87
Dec. 6.6	62.14	47.98	46.574	33.98	60.651	28.90
16.6	61.99	45.88	46.540	34.87	60.615	28.85
26.6	61.93	43.49	46.541	35.83	60.619	28.71
36.6	61.97	40.89	46.580	36.84	60.661	28.51
Mean Place	58.499	36.26	44.693	38.30	58.299	28.08
Sec δ, Tan δ	2.494	—2.284	1.000	—0.018	1.079	—0.405
a, a'	+5.7	+10.2	+3.1	+10.6	+3.5	+11.1
b, b'	—0.08	+0.9	0.00	+0.8	—0.01	+0.8
Authority and Catalogue No.	B. J.	1233	B. J.	1237	N. A.	1250

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name	α^2 Capricorni		β Capricorni		γ Cygni	
	3.77	G5	3.25	Go—Ao	2.32	F8p
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 20 ^m 14	[°] —12 ['] 45	^h 20 ^m 17	[°] —14 ['] 59	^h 20 ^m 19	[°] +40 ['] 01
Jan. 1.6	12.100 ^s	46.88 ["]	06.631 ^s	73.30 ["]	42.953 ^s	62.44 ["]
11.5	12.162 62	47.21 33	06.691 60	73.49 19	42.940 13	59.67 277
21.5	12.260 98	47.48 27	06.787 96	73.61 12	42.974 34	56.79 288
31.5	12.391 131	47.67 19	06.917 130	73.65 4	43.055 81	53.91 288
Feb. 10.5	12.554 163	47.76 9	07.079 162	73.59 6	43.182 127	51.14 277
	192	5	191	20	172	255
20.4	12.746 219	47.71 21	07.270 219	73.39 34	43.354 214	48.59 221
Mar. 2.4	12.965 243	47.50 39	07.489 244	73.05 50	43.568 252	46.38 179
12.4	13.208 265	47.11 57	07.733 266	72.55 67	43.820 285	44.59 130
22.3	13.473 284	46.54 76	07.999 286	71.88 84	44.105 314	43.29 75
Apr. 1.3	13.757 300	45.78 93	08.285 302	71.04 99	44.419 335	42.54 18
11.3	14.057 312	44.85 109	08.587 315	70.05 112	44.754 350	42.36 40
21.3	14.369 320	43.76 122	08.902 323	68.93 122	45.104 357	42.76 97
May 1.2	14.689 322	42.54 130	09.225 325	67.71 129	45.461 356	43.73 149
11.2	15.011 318	41.24 135	09.550 323	66.42 131	45.817 346	45.22 196
21.2	15.329 308	39.89 135	09.873 312	65.11 129	46.163 327	47.18 237
31.2	15.637 291	38.54 131	10.185 294	63.82 124	46.490 300	49.55 271
June 10.1	15.928 266	37.23 123	10.479 271	62.58 114	46.790 266	52.26 297
20.1	16.194 235	36.00 111	10.750 241	61.44 102	47.056 224	55.23 314
30.1	16.429 200	34.89 98	10.991 205	60.42 87	47.280 179	58.37 324
July 10.0	16.629 159	33.91 83	11.196 163	59.55 71	47.459 129	61.61 325
20.0	16.788 115	33.08 66	11.359 119	58.84 53	47.588 75	64.86 319
29.9	16.903 69	32.42 48	11.478 73	58.31 36	47.663 21	68.05 306
Aug. 8.9	16.972 23	31.94 32	11.551 26	57.95 20	47.684 32	71.11 286
18.9	16.995 21	31.62 16	11.577 18	57.75 5	47.652 82	73.97 262
28.9	16.974 62	31.46 3	11.559 58	57.70 8	47.570 128	76.59 231
Sept. 7.9	16.912 96	31.43 9	11.501 94	57.78 18	47.442 168	78.90 196
17.9	16.816 123	31.52 18	11.407 122	57.96 26	47.274 199	80.86 157
27.8	16.693 142	31.70 26	11.285 142	58.22 31	47.075 222	82.43 115
Oct. 7.8	16.551 152	31.96 30	11.143 152	58.53 34	46.853 235	83.58 71
17.8	16.399 152	32.26 33	10.991 153	58.87 36	46.618 240	84.29 24
27.7	16.247 142	32.59 36	10.838 143	59.23 35	46.378 233	84.53 23
Nov. 6.7	16.105 124	32.95 37	10.695 126	59.58 34	46.145 218	84.30 72
16.7	15.981 99	33.32 37	10.569 101	59.92 32	45.927 194	83.58 118
26.7	15.882 69	33.69 38	10.468 71	60.24 29	45.733 163	82.40 162
Dec. 6.6	15.813 34	34.07 37	10.397 36	60.53 27	45.570 127	80.78 202
16.6	15.779 3	34.44 35	10.361 —	60.80 24	45.443 85	78.76 237
26.6	15.782 39	34.79 33	10.361 38	61.04 20	45.358 41	76.39 263
36.6	15.821	35.12	10.399	61.24	45.317	73.76
Mean Place	13.647	35.76	08.173	61.83	45.037	65.68
Sec δ , Tan δ	1.025	—0.226	1.035	—0.268	1.306	+0.840
a , a'	+3.3	+11.1	+3.4	+11.3	+2.2	+11.5
b , b'	—0.01	+0.8	—0.01	+0.8	+0.03	+0.8
Authority and Catalogue No.	B.J.	1251	A.N.	1252	B.J.	1255

APPARENT PLACES OF STARS, 1931.

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AT UPPER TRANSIT AT GREENWICH.

Name	α Pavonis		ρ Capricorni		ϵ Delphini	
	2.12	B ₃	5.06	F ₀	3.98	B ₅
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 20 ^m 20	^s —56 ['] 57	^h 20 ^m 24	^s —18 ['] 02	^h 20 ^m 29	^s +11 ['] 03
Jan. 1.6	09.760 ^s 61	43.92 ["] 224	54.056 ^s 54	46.43 ["] 1	53.362 ^s 28	56.74 ["] 160
11.5	09.821 129	41.68 247	54.110 90	46.42 8	53.390 62	55.14 162
21.5	09.950 193	39.31 237	54.200 125	46.34 18	53.452 97	53.52 156
31.5	10.143 254	36.88 245	54.325 157	46.16 28	53.549 129	51.96 144
Feb. 10.5	10.397 309	34.43 241	54.482 187	45.88 40	53.678 160	50.52 125
20.4	10.706 359	32.02 232	54.669 215	45.48 53	53.838 190	49.27 99
Mar. 2.4	11.065 404	29.70 219	54.884 241	44.95 68	54.028 217	48.28 68
12.4	11.469 443	27.51 201	55.125 266	44.27 83	54.245 243	47.60 33
22.4	11.912 477	25.50 180	55.391 286	43.44 97	54.488 264	47.27 5
Apr. 1.3	12.389 502	23.70 156	55.677 303	42.47 109	54.752 284	47.32 45
11.3	12.891 521	22.14 129	55.980 318	41.38 119	55.036 298	47.77 82
21.3	13.412 533	20.85 98	56.298 328	40.19 126	55.334 308	48.59 118
May 1.2	13.945 534	19.87 66	56.626 331	38.93 129	55.642 311	49.77 150
11.2	14.479 526	19.21 31	56.957 329	37.64 129	55.953 309	51.27 176
21.2	15.005 508	18.90 4	57.286 320	36.35 125	56.262 299	53.03 198
31.2	15.513 478	18.94 39	57.606 304	35.10 116	56.561 282	55.01 213
June 10.1	15.991 437	19.33 74	57.910 280	33.94 105	56.843 259	57.14 223
20.1	16.428 386	20.07 106	58.190 251	32.89 90	57.102 229	59.37 227
30.1	16.814 325	21.13 136	58.441 215	31.99 74	57.331 194	61.64 222
July 10.1	17.139 257	22.49 160	58.656 174	31.25 56	57.525 154	63.86 215
20.0	17.396 ²⁸ 183	24.09 179	58.830 129	30.69 37	57.679 111	66.01 203
29.9	17.579 104	25.88 194	58.959 ²⁹ 82	30.32 20	57.790 ³⁰ 67	68.04 186
Aug. 8.9	17.683 25	27.82 200	59.041 34	30.12 11	57.857 22	69.90 166
18.9	17.708 52	29.82 198	59.075 10	30.08 11	57.879 22	71.56 144
28.9	17.656 124	31.80 189	59.065 53	30.19 24	57.857 61	73.00 120
Sept. 7.9	17.532 188	33.69 171	59.012 90	30.43 32	57.796 95	74.20 96
17.9	17.344 240	35.40 147	58.922 119	30.75 38	57.701 123	75.16 70
27.8	17.104 278	36.87 116	58.803 140	31.13 41	57.578 143	75.86 43
Oct. 7.8	16.826 301	38.03 79	58.663 152	31.54 41	57.435 154	76.29 17
17.8	16.525 307	38.82 38	58.511 154	31.95 39	57.281 157	76.46 10
27.8	16.218 297	39.20 4	58.357 147	32.34 36	57.124 151	76.36 35
Nov. 6.7	15.921 271	39.16 47	58.210 129	32.70 31	56.973 137	76.01 60
16.7	15.650 230	38.69 89	58.081 107	33.01 25	56.836 117	75.41 85
26.7	15.420 179	37.80 129	57.974 76	33.26 20	56.719 91	74.56 107
Dec. 6.6	15.241 118	36.51 163	57.898 42	33.46 14	56.628 60	73.49 126
16.6	15.123 52	34.88 192	57.856 6	33.60 8	56.568 27	72.23 142
26.6	15.071 17	32.96 214	57.850 31	33.68 1	56.541 7	70.81 154
36.6	15.088	30.82	57.881	33.69	56.548	69.27
Mean Place	12.023	27.93	55.581	34.46	54.943	63.97
Sec δ , Tan δ	1.834	—1.537	1.052	—0.326	1.019	+0.196
a, a'	+4.8	+11.5	+3.4	+11.8	+2.9	+12.2
b, b'	—0.06	+0.8	—0.01	+0.8	+0.01	+0.8
Authority and Catalogue No.	B. J.	1256	A. N.	1258	B. J.	1267

‡ Second transit, July 29.

† First transit, July 30.

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name	α Indi		α Delphini		β Pavonis	
Mag. Spect.	3.21	Ko	3.86	B8	3.60	A5
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 20 ^m 32	[°] —47 ['] 31	^h 20 ^m 36	[°] +15 ['] 39	^h 20 ^m 38	[°] —66 ['] 26
Jan. 1.6	41.498 ^s	76.02 ["]	24.321 ^s	57.55 ["]	43.11 ^s	87.37 ["]
11.6	41.545 47	74.28 174	24.338 17	55.76 179	43.11 0	84.70 267
21.5	41.644 99	72.40 188	24.390 52	53.93 183	43.20 9	81.87 283
31.5	41.794 150	70.42 198	24.476 86	52.14 179	43.39 19	78.93 294
Feb. 10.5	41.992 198	68.37 205	24.596 120	50.46 168	43.66 27	75.97 290
	242	206	153	148	35	292
20.4	42.234 283	66.31 205	24.749 183	48.98 122	44.01 43	73.05 281
Mar. 2.4	42.517 322	64.26 200	24.932 213	47.76 89	44.44 49	70.24 265
12.4	42.839 353	62.26 191	25.145 239	46.87 51	44.93 55	67.59 243
22.4	43.192 383	60.35 179	25.384 264	46.36 11	45.48 60	65.16 217
Apr. 1.3	43.575 408	58.56 163	25.648 283	46.25 32	46.08 64	62.99 188
11.3	43.983 427	56.93 145	25.931 299	46.57 73	46.72 67	61.11 153
21.3	44.410 440	55.48 123	26.230 310	47.30 113	47.39 70	59.58 115
May 1.3	44.850 445	54.25 98	26.540 314	48.43 148	48.09 70	58.43 76
11.2	45.295 442	53.27 71	26.854 312	49.91 180	48.79 69	57.67 35
21.2	45.737 431	52.56 41	27.166 303	51.71 205	49.48 67	57.32 7
31.2	46.168 410	52.15 10	27.469 287	53.76 225	50.15 64	57.39 50
June 10.1	46.578 380	52.05 20	27.756 263	56.01 237	50.79 58	57.89 90
20.1	46.958 341	52.25 51	28.019 232	58.38 244	51.37 52	58.79 128
30.1	47.299 292	52.76 80	28.251 198	60.82 243	51.89 44	60.07 163
July 10.1	47.591 238	53.56 106	28.449 158	63.25 238	52.33 36	61.70 191
20.0	47.829 177	54.62 128	28.607 114	65.63 227	52.69 26	63.61 215
30.0	48.006 113	55.90 145	28.721 69	67.90 211	52.95 16	65.76 231
Aug. 8.9	48.119 47	57.35 157	28.790 24	70.01 192	53.11 5	68.07 230
18.9	48.166 16	58.92 162	28.814 20	71.93 170	53.16 6	70.46 237
28.9	48.150 76	60.54 159	28.794 60	73.63 144	53.10 16	72.83 228
Sept. 7.9	48.074 130	62.13 151	28.734 95	75.07 118	52.94 24	75.11 208
17.9	47.944 174	63.64 135	28.639 124	76.25 89	52.70 32	77.19 181
27.8	47.770 207	64.99 112	28.515 145	77.14 61	52.38 38	79.00 144
Oct. 7.8	47.563 228	66.11 85	28.370 158	77.75 31	52.00 42	80.44 102
17.8	47.335 234	66.96 54	28.212 161	78.06 —	51.58 44	81.46 56
27.8	47.101 227	67.50 19	28.051 157	78.06 29	51.14 44	82.02 5
Nov. 6.7	46.874 209	67.69 16	27.894 144	77.77 59	50.70 41	82.07 47
16.7	46.665 178	67.53 52	27.750 125	77.18 87	50.29 37	81.60 97
26.7	46.487 139	67.01 85	27.625 100	76.31 113	49.92 31	80.63 144
Dec. 6.7	46.348 92	66.16 115	27.525 71	75.18 137	49.61 23	79.19 188
16.6	46.256 41	65.01 142	27.454 38	73.81 156	49.38 15	77.31 224
26.6	46.215 12	63.59 164	27.416 4	72.25 171	49.23 6	75.07 253
36.6	46.227	61.95	27.412	70.54	49.17	72.54
Mean Place	43.335	60.17	25.930	63.77	45.812	69.81
Sec δ , Tan δ	1.481	—1.093	1.039	+0.281	2.503	—2.295
a, a'	+4.2	+12.4	+2.8	+12.6	+5.4	+12.8
b, b'	—0.05	+0.8	+0.01	+0.8	—0.10	+0.8
Authority and Catalogue No.	B.J.	1270	B.J.	1277	B.J.	1279

AT UPPER TRANSIT AT GREENWICH.

Name Mag. Spect.	α Cygni (<i>Deneb</i>)		ϵ Cygni		η Cephei	
	1.33	A2p	2.64	Ko	3.59	Ko
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
Mean Solar Date						
	^h 20	^m 39	^h 20	^m 43	^h 20	^m 43
		[°] +45		[°] +33		[°] +61
		['] 01		['] 42		['] 33
Jan. 1.6	02.454	57.65	23.162	36.56	50.10	74.67
11.6	02.403	54.88	23.141	34.12	49.94	71.76
21.5	02.401	51.95	23.161	31.56	49.86	68.61
31.5	02.451	48.97	23.223	28.98	49.86	65.35
Feb. 10.5	02.552	46.06	23.326	26.48	49.94	62.11
20.4	02.702	43.33	23.469	24.17	50.10	59.01
Mar. 2.4	02.901	40.90	23.651	22.14	50.34	56.17
12.4	03.145	38.86	23.871	20.48	50.65	53.72
22.4	03.429	37.30	24.124	19.27	51.02	51.75
Apr. 1.3	03.748	36.28	24.407	18.56	51.45	50.33
11.3	04.094	35.84	24.713	18.37	51.92	49.52
21.3	04.461	35.99	25.040	18.73	52.42	49.34
May 1.3	04.839	36.73	25.378	19.61	52.93	49.79
11.2	05.219	38.03	25.720	20.98	53.45	50.85
21.2	05.592	39.84	26.059	22.81	53.95	52.50
31.2	05.948	42.10	26.387	25.03	54.42	54.66
June 10.1	06.278	44.75	26.694	27.57	54.85	57.28
20.1	06.573	47.70	26.974	30.36	55.22	60.28
30.1	06.825	50.89	27.219	33.34	55.52	63.59
July 10.1	07.030	54.21	27.423	36.41	55.77	67.10
20.0	07.181	57.59	27.582	39.50	55.94	70.73
30.0	07.277	60.96	27.692	42.55	56.02	74.40
Aug. 8.9	07.315	64.24	27.752	45.48	56.03	78.04
18.9	07.296	67.35	27.762	48.24	55.95	81.56
28.9	07.222	70.24	27.723	50.77	55.80	84.88
7.9	07.098	72.85	27.640	53.03	55.58	87.94
17.9	06.930	75.13	27.517	54.98	55.30	90.68
27.8	06.725	77.03	27.362	56.57	54.96	93.04
Oct. 7.8	06.492	78.50	27.181	57.79	54.58	94.97
17.8	06.241	79.53	26.985	58.60	54.17	96.41
27.8	05.981	80.07	26.782	58.99	53.74	97.34
Nov. 6.7	05.722	80.12	26.581	58.94	53.31	97.72
16.7	05.475	79.66	26.390	58.45	52.89	97.53
26.7	05.248	78.70	26.218	57.53	52.49	96.78
Dec. 6.7	05.047	77.26	26.071	56.21	52.12	95.48
16.6	04.882	75.37	25.954	54.50	51.80	93.65
26.6	04.758	73.09	25.871	52.47	51.54	91.31
36.6	04.679	70.50	25.827	50.18	51.34	88.66
Mean Place	04.671	58.89	25.040	39.30	53.306	73.40
Sec δ , Tan δ	1.415	+1.001	1.202	+0.667	2.100	+1.847
a, a'	+2.0	+12.8	+2.4	+13.1	+1.2	+13.1
b, b'	+0.04	+0.8	+0.03	+0.8	+0.08	+0.8
Authority and Catalogue No.	B.J.	1281	B.J.	1284	B.J.	1288

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name	ε Aquarii		μ Aquarii		32 Vulpeculæ	
	3·83	Ao	4·80	A3	5·24	K5
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 20	^m 43	^h 20	^m 48	^h 20	^m 51
		^s —9		^s —9		^s +27
		[°] 44		[°] 14		[°] 47
Jan. 1·6	55·068	68·59	54·570	46·19	35·299	36·30
11·6	55·100	69·04	54·598	46·66	35·283	34·10
21·5	55·166	69·43	54·658	47·06	35·304	31·79
31·5	55·265	69·72	54·751	47·37	35·362	29·47
Feb. 10·5	55·395	69·89	54·875	47·56	35·459	27·23
20·5	55·555	69·91	55·029	47·60	35·593	25·16
Mar. 2·4	55·743	69·76	55·213	47·45	35·763	23·36
12·4	55·958	69·40	55·424	47·10	35·968	21·91
22·4	56·199	68·83	55·660	46·54	36·205	20·88
Apr. 1·3	56·463	68·05	55·920	45·75	36·471	20·31
11·3	56·747	67·06	56·202	44·75	36·762	20·24
21·3	57·048	65·88	56·501	43·57	37·072	20·66
May 1·3	57·362	64·54	56·813	42·21	37·396	21·57
11·2	57·682	63·08	57·135	40·74	37·726	22·94
21·2	58·002	61·55	57·454	39·18	38·055	24·72
31·2	58·317	59·99	57·769	37·58	38·375	26·86
June 10·2	58·618	58·44	58·072	36·00	38·678	29·29
20·1	58·899	56·94	58·356	34·47	38·957	31·94
30·1	59·153	55·54	58·612	33·04	39·205	34·74
July 10·1	59·374	54·29	58·836	31·73	39·415	37·62
20·1	59·556	53·19	59·022	30·59	39·583	40·51
30·0	59·696	52·27	59·166	29·62	39·705	43·34
Aug. 8·9	59·791	51·54	59·265	28·85	39·780	46·05
18·9	59·840	51·00	59·318	28·27	39·806	48·59
28·9	59·844	50·64	59·327	27·87	39·786	50·91
Sept. 7·9	59·807	50·45	59·294	27·65	39·723	52·97
17·9	59·733	50·42	59·224	27·59	39·621	54·73
27·9	59·629	50·51	59·124	27·66	39·487	56·16
Oct. 7·8	59·502	50·71	59·000	27·85	39·328	57·25
17·8	59·362	51·00	58·862	28·14	39·154	57·97
27·8	59·216	51·36	58·718	28·49	38·972	58·30
Nov. 6·7	59·075	51·76	58·578	28·90	38·791	58·24
16·7	58·946	52·20	58·449	29·35	38·620	57·78
26·7	58·837	52·67	58·338	29·83	38·465	56·94
Dec. 6·7	58·753	53·15	58·252	30·33	38·333	55·73
16·6	58·699	53·63	58·195	30·84	38·228	54·19
26·6	58·677	54·11	58·168	31·33	38·155	52·35
36·6	58·688	54·56	58·175	31·80	38·117	50·28
Mean Place	56·517	57·91	56·002	35·62	37·038	39·63
Sec δ, Tan δ	1·015	—0·172	1·013	—0·163	1·130	+0·527
a, a'	+3·2	+13·1	+3·2	+13·5	+2·6	+13·6
b, b'	—0·01	+0·8	—0·01	+0·7	+0·02	+0·7
Authority and Catalogue No.	B. J.	1287	N. A.	1293	B. J.	1296

APPARENT PLACES OF STARS, 1931.

499

AT UPPER TRANSIT AT GREENWICH.

Name	γ Microscopii		θ Capricorni		61 ^r Cygni	
	4 ^h 7 ^m	G5	4 ^h 19 ^m	Ao	5 ^h 57 ^m	K5
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ^m 20 57	[°] ['] -32 31	^h ^m 21 02	[°] ['] -17 30	^h ^m 21 03	[°] ['] +38 24
Jan. 1 ^h 6 ^m	02 ^s 348	57 ^s 66 87	02 ^s 865	40 ^s 99 1	46 ^s 166	32 ^s 24 236
11 ^h 6 ^m	02 ^s 371 23	56 ^s 79 102	02 ^s 884 19	40 ^s 98 12	46 ^s 125 41	29 ^s 88 253
21 ^h 5 ^m	02 ^s 432 61	55 ^s 77 116	02 ^s 935 51	40 ^s 86 24	46 ^s 126 1	27 ^s 35 260
31 ^h 5 ^m	02 ^s 532 100	54 ^s 61 128	03 ^s 020 85	40 ^s 62 36	46 ^s 170 44	24 ^s 75 255
Feb. 10 ^h 5 ^m	02 ^s 669 137	53 ^s 33 139	03 ^s 137 117	40 ^s 26 51	46 ^s 258 88	22 ^s 20 240
20 ^h 5 ^m	02 ^s 842 206	51 ^s 94 148	03 ^s 285 179	39 ^s 75 66	46 ^s 390 176	19 ^s 80 214
Mar. 2 ^h 4 ^m	03 ^s 048 239	50 ^s 46 155	03 ^s 464 208	39 ^s 09 83	46 ^s 566 217	17 ^s 66 179
12 ^h 4 ^m	03 ^s 287 269	48 ^s 91 160	03 ^s 672 236	38 ^s 26 99	46 ^s 783 257	15 ^s 87 136
22 ^h 4 ^m	03 ^s 556 296	47 ^s 31 163	03 ^s 908 261	37 ^s 27 114	47 ^s 040 291	14 ^s 51 86
Apr. 1 ^h 4 ^m	03 ^s 852 321	45 ^s 68 162	04 ^s 169 285	36 ^s 13 128	47 ^s 331 321	13 ^s 65 33
11 ^h 3 ^m	04 ^s 173 341	44 ^s 06 159	04 ^s 454 304	34 ^s 85 139	47 ^s 652 343	13 ^s 32 23
21 ^h 3 ^m	04 ^s 514 358	42 ^s 47 152	04 ^s 758 320	33 ^s 46 147	47 ^s 995 359	13 ^s 55 77
May 1 ^h 3 ^m	04 ^s 872 367	40 ^s 95 142	05 ^s 078 330	31 ^s 99 152	48 ^s 354 367	14 ^s 32 131
11 ^h 2 ^m	05 ^s 239 370	39 ^s 53 127	05 ^s 408 333	30 ^s 47 152	48 ^s 721 366	15 ^s 63 179
21 ^h 2 ^m	05 ^s 609 366	38 ^s 26 108	05 ^s 741 330	28 ^s 95 148	49 ^s 087 356	17 ^s 42 222
31 ^h 2 ^m	05 ^s 975 353	37 ^s 18 88	06 ^s 071 320	27 ^s 47 140	49 ^s 443 337	19 ^s 64 259
June 10 ^h 2 ^m	06 ^s 328 333	36 ^s 30 64	06 ^s 391 302	26 ^s 07 127	49 ^s 780 310	22 ^s 23 289
20 ^h 1 ^m	06 ^s 661 304	35 ^s 66 39	06 ^s 693 276	24 ^s 80 112	50 ^s 090 275	25 ^s 12 311
30 ^h 1 ^m	06 ^s 965 268	35 ^s 27 14	06 ^s 969 244	23 ^s 68 93	50 ^s 365 234	28 ^s 23 325
July 10 ^h 1 ^m	07 ^s 233 225	35 ^s 13 13	07 ^s 213 206	22 ^s 75 74	50 ^s 599 187	31 ^s 48 331
20 ^h 1 ^m	07 ^s 458 177	35 ^s 26 35	07 ^s 419 163	22 ^s 01 53	50 ^s 786 137	34 ^s 79 330
30 ^h 0 ^m	07 ^s 635 125	35 ^s 61 58	07 ^s 582 118	21 ^s 48 32	50 ^s 923 85	38 ^s 09 322
Aug. 8 ^h 9 ^m	07 ^s 760 73	36 ^s 19 76	07 ^s 700 70	21 ^s 16 11	51 ^s 008† 33	41 ^s 31 308
18 ^h 9 ^m	07 ^s 833 20	36 ^s 95 90	07 ^s 770 25	21 ^s 05 6	51 ^s 041 19	44 ^s 39 287
28 ^h 9 ^m	07 ^s 853 30	37 ^s 85 99	07 ^s 795 21	21 ^s 11 22	51 ^s 022 66	47 ^s 26 261
Sept. 7 ^h 9 ^m	07 ^s 823 74	38 ^s 84 103	07 ^s 774 60	21 ^s 33 34	50 ^s 956 110	49 ^s 87 231
17 ^h 9 ^m	07 ^s 749 113	39 ^s 87 101	07 ^s 714 94	21 ^s 67 43	50 ^s 846 145	52 ^s 18 196
27 ^h 9 ^m	07 ^s 636 143	40 ^s 88 95	07 ^s 620 119	22 ^s 10 49	50 ^s 701 173	54 ^s 14 157
Oct. 7 ^h 8 ^m	07 ^s 493 162	41 ^s 83 82	07 ^s 501 138	22 ^s 59 52	50 ^s 528 194	55 ^s 71 116
17 ^h 8 ^m	07 ^s 331 171	42 ^s 65 67	07 ^s 363 144	23 ^s 11 51	50 ^s 334 205	56 ^s 87 72
27 ^h 8 ^m	07 ^s 160 170	43 ^s 32 48	07 ^s 219 144	23 ^s 62 48	50 ^s 129 206	57 ^s 59 26
Nov. 6 ^h 8 ^m	06 ^s 990 159	43 ^s 80 27	07 ^s 075 135	24 ^s 10 42	49 ^s 923 199	57 ^s 85 20
16 ^h 7 ^m	06 ^s 831 139	44 ^s 07 5	06 ^s 940 118	24 ^s 52 36	49 ^s 724 184	57 ^s 65 66
26 ^h 7 ^m	06 ^s 692 111	44 ^s 12 18	06 ^s 822 95	24 ^s 88 29	49 ^s 540 163	56 ^s 99 110
Dec. 6 ^h 7 ^m	06 ^s 581 78	43 ^s 94 40	06 ^s 727 66	25 ^s 17 21	49 ^s 377 135	55 ^s 89 152
16 ^h 6 ^m	06 ^s 503 42	43 ^s 54 59	06 ^s 661 36	25 ^s 38 11	49 ^s 242 102	54 ^s 37 189
26 ^h 6 ^m	06 ^s 461 3	42 ^s 95 78	06 ^s 625 2	25 ^s 49 3	49 ^s 140 64	52 ^s 48 219
36 ^h 6 ^m	06 ^s 458	42 ^s 17	06 ^s 623	25 ^s 52	49 ^s 076	50 ^s 29
Mean Place	03 ^s 811	42 ^s 94	04 ^s 243	28 ^s 86	48 ^s 122	33 ^s 15
Sec δ , Tan δ	1 ^s 186	-0 ^s 638	1 ^s 049	-0 ^s 315	1 ^s 276	+0 ^s 793
a , a'	+3 ^s 7	+14 ^s 0	+3 ^s 4	+14 ^s 3	+2 ^s 3	+14 ^s 4
b , b'	-0 ^s 03	+0 ^s 7	-0 ^s 01	+0 ^s 7	+0 ^s 04	+0 ^s 7
Authority and Catalogue No.	N.A.	1301	N.A.	1305	A.E.	1308

No. 1308. Corrected for a parallax of 0^s 30.

† Second transit, Aug. 8.

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name	ζ Cygni		α Equulei		θ ¹ Microscopii	
	3·40	Ko	4·14	F8—A3	4·92	A2p
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ^m 21 09	[°] ['] +29 56	^h ^m 21 12	[°] ['] + 4 57	^h ^m 21 16	[°] ['] -41 05
Jan. 1·6	58·120 ^s	33·34 ["]	21·063 ^s	34·84 ["]	19·817 ^s	84·73 ["]
11·6	58·082	31·18	21·061	33·69	19·811	83·42
21·5	58·081	28·88	21·089	32·54	19·848	81·91
31·5	58·117	26·53	21·149	31·44	19·928	80·21
Feb. 10·5	58·192	24·23	21·240	30·44	20·049	78·37
20·5	58·305	22·08	21·361	29·61	20·211	76·43
Mar. 2·4	58·457	20·17	21·513	29·00	20·413	74·40
12·4	58·646	18·59	21·696	28·64	20·652	72·33
22·4	58·870	17·41	21·907	28·59	20·926	70·26
Apr. 1·4	59·126	16·68	22·145	28·86	21·234	68·21
11·3	59·410	16·44	22·407	29·46	21·572	66·23
21·3	59·718	16·70	22·691	30·37	21·936	64·35
May 1·3	60·043	17·47	22·991	31·59	22·320	62·62
11·2	60·378	18·71	23·302	33·08	22·719	61·07
21·2	60·715	20·39	23·618	34·80	23·125	59·75
31·2	61·045	22·45	23·931	36·69	23·529	58·69
June 10·2	61·362	24·83	24·234	38·70	23·923	57·91
20·1	61·656	27·46	24·521	40·77	24·298	57·44
30·1	61·921	30·29	24·783	42·86	24·644	57·28
July 10·1	62·150	33·21	25·014	44·89	24·953	57·44
20·1	62·337	36·17	25·209	46·83	25·218	57·91
30·0	62·479	39·11	25·364	48·64	25·431	58·66
Aug. 9·0	62·572 [†]	41·95	25·476	50·28	25·589	59·65
18·9	62·616	44·64	25·543	51·73	25·689	60·85
28·9	62·613	47·12	25·566	52·97	25·731	62·20
Sept. 7·9	62·565	49·37	25·548	53·98	25·715	63·65
17·9	62·477	51·32	25·493	54·77	25·648	65·11
27·9	62·355	52·96	25·405	55·34	25·535	66·52
Oct. 7·8	62·204	54·24	25·293	55·69	25·385	67·82
17·8	62·035	55·15	25·163	55·82	25·209	68·95
27·8	61·856	55·68	25·025	55·75	25·018	69·84
Nov. 6·8	61·674	55·81	24·885	55·48	24·823	70·47
16·7	61·497	55·53	24·753	55·03	24·635	70·79
26·7	61·334	54·84	24·634	54·40	24·464	70·80
Dec. 6·7	61·190	53·77	24·534	53·62	24·320	70·49
16·6	61·070	52·34	24·458	52·70	24·207	69·86
26·6	60·979	50·59	24·408	51·67	24·133	68·95
36·6	60·921	48·58	24·388	50·57	24·100	67·77
Mean Place	59·847	35·27	22·472	42·10	21·245	68·22
Sec δ, Tan δ	1·154	+0·576	1·004	+0·087	1·327	-0·872
a, a'	+2·6	+14·8	+3·0	+14·9	+3·8	+15·1
b, b'	+0·03	+0·7	0·00	+0·7	-0·04	+0·7
Authority and Catalogue No.	B.J.	1314	B.J.	1318	A.N.	1323

† First transit, Aug. 9.

APPARENT PLACES OF STARS, 1931.

501

AT UPPER TRANSIT AT GREENWICH.

Name	α Cephei		ι Capricorni		γ Pavonis	
	2.60	A5	4.30	Ko	4.30	F8
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ₂₁ ^m ₁₆	[°] ₊₆₂ ['] ₁₇	^h ₂₁ ^m ₁₈	[°] ₋₁₇ ['] ₀₇	^h ₂₁ ^m ₂₀	[°] ₋₆₅ ['] ₄₀
Jan. 1.6	52.79	38.13	23.120	57.75	43.70	66.90
11.6	52.58	35.49	23.123	57.75	43.60	64.39
21.6	52.43	32.54	23.158	57.63	43.59	61.62
31.5	52.36	29.40	23.225	57.38	43.67	58.65
Feb. 10.5	52.37	26.18	23.324	57.00	43.82	55.56
20.5	52.47	23.03	23.455	56.46	44.06	52.42
Mar. 2.4	52.65	20.06	23.616	55.76	44.37	49.30
12.4	52.91	17.39	23.808	54.89	44.76	46.26
22.4	53.24	15.14	24.028	53.85	45.21	43.37
Apr. 1.4	53.64	13.38	24.277	52.65	45.72	40.68
11.3	54.09	12.19	24.551	51.29	46.28	38.25
21.3	54.58	11.61	24.847	49.82	46.89	36.12
May 1.3	55.09	11.65	25.161	48.26	47.53	34.33
11.3	55.62	12.31	25.488	46.65	48.19	32.93
21.2	56.15	13.57	25.821	45.03	48.86	31.94
31.2	56.66	15.38	26.153	43.45	49.52	31.39
June 10.2	57.14	17.68	26.478	41.95	50.17	31.29
20.1	57.57	20.42	26.787	40.57	50.78	31.64
30.1	57.94	23.50	27.073	39.35	51.35	32.41
July 10.1	58.25	26.87	27.328	38.32	51.85	33.59
20.1	58.48	30.42	27.547	37.49	52.27	35.15
30.0	58.64	34.08	27.725	36.88	52.61	37.03
Aug. 9.0	58.72	37.77	27.858	36.50	52.85	39.17
18.9	58.71	41.41	27.944	36.32	52.99	41.48
28.9	58.63	44.92	27.983	36.34	53.03	43.88
Sept. 7.9	58.47	48.22	27.978	36.54	52.97	46.29
17.9	58.24	51.26	27.932	36.87	52.81	48.60
27.9	57.95	53.97	27.851	37.32	52.56	50.71
Oct. 7.8	57.61	56.28	27.742	37.83	52.25	52.54
17.8	57.23	58.15	27.614	38.38	51.88	54.01
27.8	56.82	59.52	27.474	38.93	51.48	55.05
Nov. 6.8	56.40	60.37	27.333	39.46	51.06	55.60
16.7	55.97	60.65	27.199	39.93	50.64	55.64
26.7	55.55	60.36	27.077	40.35	50.25	55.16
Dec. 6.7	55.16	59.50	26.977	40.68	49.90	54.15
16.7	54.81	58.08	26.901	40.93	49.61	52.66
26.6	54.50	56.15	26.854	41.07	49.38	50.73
36.6	54.24	53.77	26.837	41.12	49.24	48.41
Mean Place	55.957	34.06	24.424	45.68	45.788	47.40
Sec δ , Tan δ	2.151	+1.904	1.046	-0.308	2.428	-2.213
a, a'	+1.4	+15.2	+3.3	+15.3	+5.0	+15.4
b, b'	+0.10	+0.7	-0.02	+0.6	-0.11	+0.6
Authority and Catalogue No.	B.J.	1324	N.A.	1325	B.J.	1327

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name	ζ Capricorni		β Cephei		β Aquarii	
	3·86	G5p	3·33	Br	3·07	Go
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 21 ^m 22	[°] —22 ['] 42	^h 21 ^m 27	[°] +70 ['] 15	^h 21 ^m 27	[°] —5 ['] 52
Jan. 1·6	42°568 ^s	53°13 ["]	42°36 ^s	33°67 ["]	54°358 ^s	41°37 ["]
11·6	42°567 ^I	52°82 ³¹	41°99 ³⁷	31°16 ²⁵¹	54°350 ⁸	41°94 ⁵⁷
21·6	42°599 ³²	52°37 ⁴⁵	41°71 ²⁸	28°29 ²⁸⁷	54°372 ²²	42°46 ⁵²
31·5	42°664 ⁶⁵	51°77 ⁶⁰	41°54 ¹⁷	25°16 ³¹³	54°424 ⁵²	42°88 ⁴²
Feb. 10·5	42°762 ⁹⁸	51°03 ⁷⁴	41°49 ⁵	21°91 ³²⁵	54°506 ⁸²	43°18 ³⁰
	131	89	7	324	112	14
20·5	42°893 ¹⁶³	50°14 ¹⁰⁴	41°56 ¹⁸	18°67 ³¹¹	54°618 ¹⁴²	43°32 ⁵
Mar. 2·5	43°056 ¹⁹⁴	49°10 ¹¹⁹	41°74 ³⁰	15°56 ²⁸⁵	54°760 ¹⁷³	43°27 ²⁷
12·4	43°250 ²²⁴	47°91 ¹³³	42°04 ⁴⁰	12°71 ²⁴⁸	54°933 ²⁰²	43°00 ⁵¹
22·4	43°474 ²⁵³	46°58 ¹⁴⁴	42°44 ⁵⁰	10°23 ²⁰⁰	55°135 ²³¹	42°49 ⁷⁶
Apr. 1·4	43°727 ²⁷⁹	45°14 ¹⁵⁵	42°94 ⁵⁷	08°23 ¹⁴⁷	55°366 ²⁵⁶	41°73 ¹⁰⁰
11·3	44°006 ³⁰³	43°59 ¹⁶²	43°51 ⁶³	06°76 ⁸⁷	55°622 ²⁸⁰	40°73 ¹²²
21·3	44°309 ³²²	41°97 ¹⁶⁵	44°14 ⁶⁸	05°89 ²⁴	55°902 ²⁹⁹	39°51 ¹⁴³
May 1·3	44°631 ³³⁶	40°32 ¹⁶⁴	44°82 ⁶⁹	05°65 ³⁸	56°201 ³¹³	38°08 ¹⁵⁹
11·3	44°967 ³⁴³	38°68 ¹⁶⁰	45°51 ⁶⁹	06°03 ⁹⁹	56°514 ³²⁰	36°49 ¹⁷²
21·2	45°310 ³⁴⁴	37°08 ¹⁵¹	46°20 ⁶⁶	07°02 ¹⁵⁷	56°834 ³²¹	34°77 ¹⁷⁹
31·2	45°654 ³³⁶	35°57 ¹³⁸	46°86 ⁶³	08°59 ²¹⁰	57°155 ³¹⁴	32°98 ¹⁸²
June 10·2	45°990 ³²¹	34°19 ¹²¹	47°49 ⁵⁶	10°69 ²⁵⁶	57°469 ³⁰⁰	31°16 ¹⁷⁹
20·2	46°311 ²⁹⁷	32°98 ¹⁰¹	48°05 ⁴⁹	13°25 ²⁹⁷	57°769 ²⁷⁹	29°37 ¹⁷¹
30·1	46°608 ²⁶⁸	31°97 ⁷⁸	48°54 ⁴¹	16°22 ³²⁸	58°048 ²⁵⁰	27°66 ¹⁶⁰
July 10·1	46°876 ²³¹	31°19 ⁵⁵	48°95 ³⁰	19°50 ³⁵¹	58°298 ²¹⁵	26°06 ¹⁴⁵
20·1	47°107 ¹⁸⁸	30°64 ³¹	49°25 ²⁰	23°01 ³⁶⁷	58°513 ¹⁷⁶	24°61 ¹²⁷
30·0	47°295 ¹⁴¹	30°33 ⁷	49°45 ⁹	26°68 ³⁷⁴	58°689 ¹³³	23°34 ¹⁰⁷
Aug. 9·0	47°436 ⁹⁴	30°26 ¹⁵	49°54 ¹	30°42 ³⁷⁴	58°822 ⁸⁹	22°27 ⁸⁶
18·9	47°530 ⁴⁶	30°41 ³⁴	49°53 ¹²	34°16 ³⁶⁶	58°911 ⁴⁴	21°41 ⁶⁵
28·9	47°576 ²	30°75 ⁵¹	49°41 ²²	37°82 ³⁴⁹	58°955 ¹	20°76 ⁴⁴
Sept. 7·9	47°574 ⁴⁴	31°26 ⁶³	49°19 ³²	41°31 ³²⁶	58°956 ³⁸	20°32 ²⁵
17·9	47°530 ⁸¹	31°89 ⁷⁰	48°87 ⁴⁰	44°57 ²⁹⁶	58°918 ⁷²	20°07 ⁸
27·9	47°449 ¹¹¹	32°59 ⁷³	48°47 ⁴⁷	47°53 ²⁵⁹	58°846 ⁹⁹	19°99 ⁸
Oct. 7·9	47°338 ¹³³	33°32 ⁷³	48°00 ⁵³	50°12 ²¹⁷	58°747 ¹¹⁸	20°07 ²¹
17·8	47°205 ¹⁴⁴	34°05 ⁶⁷	47°47 ⁵⁷	52°29 ¹⁶⁸	58°629 ¹³⁰	20°28 ³²
27·8	47°061 ¹⁴⁷	34°72 ⁵⁹	46°90 ⁶¹	53°97 ¹¹⁶	58°499 ¹³³	20°60 ⁴¹
Nov. 6·8	46°914 ¹⁴²	35°31 ⁴⁸	46°29 ⁶²	55°13 ⁶⁰	58°366 ¹²⁹	21°01 ⁴⁸
16·7	46°772 ¹²⁸	35°79 ³⁵	45°67 ⁶¹	55°73 [—]	58°237 ¹¹⁷	21°49 ⁵³
26·7	46°644 ¹⁰⁷	36°14 ²¹	45°06 ⁵⁹	55°73 ⁵⁹	58°120 ¹⁰⁰	22°02 ⁵⁷
Dec. 6·7	46°537 ⁸²	36°35 ⁶	44°47 ⁵⁵	55°14 ¹¹⁷	58°020 ⁷⁸	22°59 ⁶⁰
16·7	46°455 ⁵³	36°41 ⁸	43°92 ⁵⁰	53°97 ¹⁷³	57°942 ⁵³	23°19 ⁶⁰
26·6	46°402 ²¹	36°33 ²³	43°42 ⁴²	52°24 ²²²	57°889 ²⁵	23°79 ⁵⁸
36·6	46°381	36°10	43°00	50°02	57°864	24°37
Mean Place	43·854	39·89	46·590	27·77	55·646	31·92
Sec δ, Tan δ	1·084	—0·419	2·960	+2·786	1·005	—0·103
a, a'	+3·4	+15·5	+0·8	+15·8	+3·2	+15·8
b, b'	—0·02	+0·6	+0·15	+0·6	—0·01	+0·6
Authority and Catalogue No.	B. J.	1328	B. J.	1333	B. J.	1332

AT UPPER TRANSIT AT GREENWICH.

Name		ξ Aquarii		ε Pegasi		δ Capricorni	
Mag. Spect.		4.78	A5	2.54	Ko	2.98	A5
Mean Solar Date		R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
		^h 21 ^m 34	[°] —8 ['] 09	^h 21 ^m 40	[°] +9 ['] 33	^h 21 ^m 43	[°] —16 ['] 26
Jan.	1.6	03.530	62.01	46.432	23.31	12.897	39.84
	11.6	03.518 ¹²	62.46 45	46.403 29	22.06 ¹²⁵	12.879 ¹⁸	39.88 ⁴
	21.6	03.535 ¹⁷	62.85 39	46.402 ¹	20.78 ¹²⁸	12.891 ¹²	39.80 ⁸
	31.5	03.582 47	63.12 27	46.431 29	19.52 ¹²⁶	12.933 ⁴²	39.57 ²³
Feb.	10.5	03.659 ⁷⁷	63.26 ¹⁴	46.490 59	18.33 ¹¹⁹	13.005 ⁷²	39.18 ³⁹
		108	2	90	104	104	55
	20.5	03.767 ¹³⁸	63.24 20	46.580 ¹²³	17.29 83	13.109 ¹³⁵	38.63 ⁷²
Mar.	2.5	03.905 ¹⁶⁹	63.04 42	46.703 ¹⁵⁵	16.46 58	13.244 ¹⁶⁶	37.91 ⁹¹
	12.4	04.074 ¹⁹⁸	62.62 65	46.858 ¹⁸⁶	15.88 ²⁸	13.410 ¹⁹⁷	37.00 ¹⁰⁹
	22.4	04.272 ²²⁸	61.97 87	47.044 ²¹⁸	15.60 ⁶	13.607 ²²⁸	35.91 ¹²⁷
Apr.	1.4	04.500 ²⁵⁵	61.10 ¹¹¹	47.262 ²⁴⁶	15.66 41	13.835 ²⁵⁶	34.64 ¹⁴³
	11.4	04.755 ²⁷⁸	59.99 ¹³⁰	47.508 ²⁷²	16.07 77	14.091 ²⁸²	33.21 ¹⁵⁶
	21.3	05.033 ²⁹⁹	58.69 ¹⁴⁸	47.780 ²⁹²	16.84 ¹¹¹	14.373 ³⁰³	31.65 ¹⁶⁶
May	1.3	05.332 ³¹³	57.21 ¹⁶³	48.072 ³⁰⁸	17.95 ¹⁴²	14.676 ³²⁰	29.99 ¹⁷³
	11.3	05.645 ³²²	55.58 ¹⁷³	48.380 ³¹⁷	19.37 ¹⁶⁹	14.996 ³³¹	28.26 ¹⁷⁴
	21.2	05.967 ³²⁴	53.85 ¹⁷⁸	48.697 ³¹⁹	21.06 ¹⁹¹	15.327 ³³⁵	26.52 ¹⁷²
	31.2	06.291 ³¹⁷	52.07 ¹⁷⁸	49.016 ³¹³	22.97 ²⁰⁹	15.662 ³³¹	24.80 ¹⁶⁵
June	10.2	06.608 ³⁰⁵	50.29 ¹⁷⁴	49.329 ³⁰⁰	25.06 ²²⁰	15.993 ³¹⁹	23.15 ¹⁵³
	20.2	06.913 ²⁸⁴	48.55 ¹⁶⁵	49.629 ²⁷⁹	27.26 ²²⁷	16.312 ²⁹⁹	21.62 ¹³⁷
	30.1	07.197 ²⁵⁶	46.90 ¹⁵¹	49.908 ²⁵⁰	29.53 ²²⁵	16.611 ²⁷²	20.25 ¹¹⁸
July	10.1	07.453 ²²²	45.39 ¹³⁶	50.158 ²¹⁷	31.78 ²²⁰	16.883 ²³⁸	19.07 ⁹⁶
	20.1	07.675 ¹⁸³	44.03 ¹¹⁶	50.375 ¹⁷⁸	33.98 ²⁰⁹	17.121 ²⁰⁰	18.11 ⁷³
	30.1	07.858 ¹⁴⁰	42.87 ⁹⁶	50.553 ¹³⁶	36.07 ¹⁹⁵	17.321 ¹⁵⁶	17.38 ⁴⁹
Aug.	9.0	07.998 ⁹⁷	41.91 ⁷⁴	50.689 ⁹³	38.02 ¹⁷⁷	17.477 ¹¹⁰	16.89 ²⁶
	18.9	08.095 ⁵¹	41.17 ⁵²	50.782 ⁴⁸	39.79 ¹⁵⁶	17.587 ⁶⁴	16.63 ⁴
	28.9	08.146 ⁸	40.65 ³²	50.830 ⁵	41.35 ¹³³	17.651 ¹⁸	16.59 ¹⁶
	7.9	08.154 ³²	40.33 ¹⁴	50.835 ³³	42.68 ¹¹⁰	17.669 ²³	16.75 ³²
Sept.	17.9	08.122 ⁶⁶	40.19 ⁴	50.802 ⁶⁷	43.78 ⁸⁶	17.646 ⁶⁰	17.07 ⁴⁶
	27.9	08.056 ⁹⁵	40.23 ⁷	50.735 ⁹⁵	44.64 ⁶¹	17.586 ⁹¹	17.53 ⁵⁵
Oct.	7.9	07.961 ¹¹⁴	40.40 ³⁰	50.640 ¹¹⁵	45.25 ³⁶	17.495 ¹¹³	18.08 ⁶⁰
	17.8	07.847 ¹²⁸	40.70 ³⁸	50.525 ¹²⁹	45.61 ¹³	17.382 ¹²⁸	18.68 ⁶³
	27.8	07.719 ¹³²	41.08 ⁴⁵	50.396 ¹³⁴	45.74 ¹⁰	17.254 ¹³⁴	19.31 ⁶⁰
Nov.	6.8	07.587 ¹²⁸	41.53 ⁵⁰	50.262 ¹³³	45.64 ³³	17.120 ¹³²	19.91 ⁵⁶
	16.8	07.459 ¹¹⁷	42.03 ⁵³	50.129 ¹²⁵	45.31 ⁵⁵	16.988 ¹²³	20.47 ⁵⁰
	26.7	07.342 ¹⁰²	42.56 ⁵³	50.004 ¹¹¹	44.76 ⁷⁴	16.865 ¹⁰⁷	20.97 ⁴²
Dec.	6.7	07.240 ⁸¹	43.09 ⁵³	49.893 ⁹²	44.02 ⁹¹	16.758 ⁸⁷	21.39 ³²
	16.7	07.159 ⁵⁶	43.62 ⁵¹	49.801 ⁷⁰	43.11 ¹⁰⁷	16.671 ⁶³	21.71 ²¹
	26.6	07.103 ²⁹	44.13 ⁴⁸	49.731 ⁴⁵	42.04 ¹¹⁸	16.608 ³⁵	21.92 ¹⁰
	36.6	07.074	44.61	49.686	40.86	16.573	22.02
Mean Place		04.782	52.10	47.771	28.61	14.082	28.03
Sec δ, Tan δ		1.010	—0.143	1.014	+0.168	1.043	—0.295
a, a'		+3.2	+16.1	+2.9	+16.5	+3.3	+16.6
b, b'		—0.01	+0.6	+0.01	+0.6	—0.02	+0.6
Authority and Catalogue No.		N.A.	1338	B.J.	1345	B.J.	1349

† Second transit, Aug. 18.

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name	γ Gruis		16 Pegasi		α Aquarii	
	3.16	B8	5.05	B3	3.19	Go
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 21 ^m 49	[°] —37 ['] 41	^h 21 ^m 49	[°] +25 ['] 35	^h 22 ^m 02	[°] —0 ['] 39
Jan. 1.6	44.242 ^s	40.82 ["]	53.657 ^s	58.51 ["]	13.249 ^s	27.83 ["]
11.6	44.203 39	39.79 103	53.597 60	56.74 177	13.213 36	28.59 76
21.6	44.201 ²	38.51 128	53.566 31	54.82 192	13.202 11	29.31 72
31.5	44.236 35	37.01 150	53.568 2	52.82 200	13.218 16	29.96 65
Feb. 10.5	44.310 74	35.32 169	53.604 36	50.84 198	13.263 45	30.50 54
	111	186	72	189	74	39
20.5	44.421 150	33.46 198	53.676 109	48.95 170	13.337 105	30.89 20
Mar. 2.5	44.571 187	31.48 209	53.785 146	47.25 143	13.442 137	31.09 4
12.4	44.758 225	29.39 216	53.931 184	45.82 109	13.579 169	31.05 29
22.4	44.983 261	27.23 219	54.115 219	44.73 70	13.748 201	30.76 56
Apr. 1.4	45.244 294	25.04 217	54.334 252	44.03 26	13.949 232	30.20 85
11.4	45.538 325	22.87 213	54.586 281	43.77 19	14.181 259	29.35 111
21.3	45.863 350	20.74 203	54.867 305	43.96 65	14.440 283	28.24 137
May 1.3	46.213 371	18.71 189	55.172 323	44.61 110	14.723 301	26.87 158
11.3	46.584 385	16.82 170	55.495 332	45.71 151	15.024 315	25.29 176
21.2	46.969 390	15.12 147	55.827 335	47.22 187	15.339 321	23.53 190
31.2	47.359 387	13.65 120	56.162 328	49.09 218	15.660 319	21.63 198
June 10.2	47.746 375	12.45 91	56.490 313	51.27 244	15.979 310	19.65 200
20.2	48.121 355	11.54 59	56.803 291	53.71 262	16.289 292	17.65 198
30.1	48.476 323	10.95 26	57.094 261	56.33 274	16.581 268	15.67 190
July 10.1	48.799 285	10.69 7	57.355 225	59.07 280	16.849 238	13.77 179
20.1	49.084 240	10.76 39	57.580 184	61.87 278	17.087 202	11.98 163
30.1	49.324 189	11.15 69	57.764 139	64.65 272	17.289 161	10.35 144
Aug. 9.0	49.513 135	11.84 94	57.903 93	67.37 258	17.450 118	08.91 124
19.0	49.648 79	12.78 116	57.996 47	69.95 242	17.568 74	07.67 102
28.9	49.727 24	13.94 132	58.043 2	72.37 220	17.642 32	06.65 79
Sept. 7.9	49.751 27	15.26 141	58.045 39	74.57 195	17.674 8	05.86 57
17.9	49.724 74	16.67 143	58.006 76	76.52 166	17.666 44	05.29 36
27.9	49.650 113	18.10 140	57.930 107	78.18 136	17.622 73	04.93 18
Oct. 7.9	49.537 143	19.50 128	57.823 129	79.54 103	17.549 97	04.75 1
17.8	49.394 164	20.78 111	57.694 146	80.57 69	17.452 113	04.76 17
27.8	49.230 175	21.89 88	57.548 155	81.26 33	17.339 121	04.93 31
Nov. 6.8	49.055 175	22.77 62	57.393 156	81.59 3	17.218 123	05.24 43
16.8	48.880 166	23.39 33	57.237 150	81.56 39	17.095 118	05.67 53
26.7	48.714 149	23.72 2	57.087 139	81.17 74	16.977 107	06.20 61
Dec. 6.7	48.565 124	23.74 29	56.948 122	80.43 107	16.870 91	06.81 68
16.7	48.441 95	23.45 59	56.826 101	79.36 137	16.779 73	07.49 73
26.6	48.346 61	22.86 88	56.725 77	77.99 162	16.706 51	08.22 73
36.6	48.285	21.98	56.648	76.37	16.655	08.96 74
Mean Place	45.414	24.32	55.164	59.33	14.414	20.44
Sec δ , Tan δ	1.264	—0.773	1.109	+0.479	1.000	—0.011
a , a'	+3.6	+16.9	+2.7	+16.9	+3.1	+17.5
b , b'	—0.04	+0.5	+0.03	+0.5	0.00	+0.5
Authority and Catalogue No.	B.J.	1356	B.J.	1357	B.J.	1370

APPARENT PLACES OF STARS, 1931.

505

AT UPPER TRANSIT AT GREENWICH.

Name Mag. Spect.	ι Pegasi		α Gruis		ζ Cephei	
	3·96	F5	2·16	B5	3·62	Ko
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ₂₂ ^m ₀₃	[°] ₊₂₅ ['] ₀₀	^h ₂₂ ^m ₀₃	[°] ₋₄₇ ['] ₁₇	^h ₂₂ ^m ₀₈	[°] ₊₅₇ ['] ₅₁
Jan. 1·6	^s _{46·315} ₆₉	^s _{26·72} ₁₆₆	^s _{52·471} ₇₆	^s _{63·21} ₁₄₂	^s _{24·877} ₂₃₁	^s _{46·31} ₂₁₁
11·6	_{46·246} ₄₁	_{25·06} ₁₈₂	_{52·395} ₃₄	_{61·79} ₁₇₄	_{24·646} ₁₈₂	_{44·20} ₂₄₉
21·6	_{46·205} ₁₀	_{23·24} ₁₉₀	_{52·361} ₉	_{60·05} ₂₀₀	_{24·464} ₁₂₅	_{41·71} ₂₇₇
31·6	_{46·195} ₂₃	_{21·34} ₁₉₀	_{52·370} ₅₄	_{58·05} ₂₂₃	_{24·339} ₆₂	_{38·94} ₂₉₅
Feb. 10·5	_{46·218} ₅₈	_{19·44} ₁₈₂	_{52·424} ₉₉	_{55·82} ₂₄₀	_{24·277} ₇	_{35·99} ₃₀₀
20·5	_{46·276} ₉₅	_{17·62} ₁₆₆	_{52·523} ₁₄₅	_{53·42} ₂₅₃	_{24·284} ₇₉	_{32·99} ₂₉₃
Mar. 2·5	_{46·371} ₁₃₂	_{15·96} ₁₄₀	_{52·668} ₁₈₉	_{50·89} ₂₆₁	_{24·363} ₁₅₁	_{30·06} ₂₇₃
12·4	_{46·503} ₁₇₁	_{14·56} ₁₀₈	_{52·857} ₂₃₄	_{48·28} ₂₆₄	_{24·514} ₂₂₂	_{27·33} ₂₄₃
22·4	_{46·674} ₂₀₈	_{13·48} ₇₁	_{53·091} ₂₇₇	_{45·64} ₂₆₂	_{24·736} ₂₈₈	_{24·90} ₂₀₂
Apr. 1·4	_{46·882} ₂₄₂	_{12·77} ₂₉	_{53·368} ₃₁₇	_{43·02} ₂₅₄	_{25·024} ₃₄₈	_{22·88} ₁₅₄
11·4	_{47·124} ₂₇₃	_{12·48} ₁₆	_{53·685} ₃₅₄	_{40·48} ₂₄₂	_{25·372} ₃₉₉	_{21·34} ₁₀₀
21·3	_{47·397} ₂₉₉	_{12·64} ₆₀	_{54·039} ₃₈₆	_{38·06} ₂₂₆	_{25·771} ₄₄₀	_{20·34} ₄₂
May 1·3	_{47·696} ₃₁₉	_{13·24} ₁₀₃	_{54·425} ₄₁₁	_{35·80} ₂₀₃	_{26·211} ₄₆₈	_{19·92} ₁₈
11·3	_{48·015} ₃₃₁	_{14·27} ₁₄₄	_{54·836} ₄₂₉	_{33·77} ₁₇₇	_{26·679} ₄₈₃	_{20·10} ₇₆
21·3	_{48·346} ₃₃₅	_{15·71} ₁₈₁	_{55·265} ₄₃₉	_{32·00} ₁₄₆	_{27·162} ₄₈₅	_{20·86} ₁₃₃
31·2	_{48·681} ₃₃₂	_{17·52} ₂₁₂	_{55·704} ₄₃₈	_{30·54} ₁₁₁	_{27·647} ₄₇₃	_{22·19} ₁₈₅
June 10·2	_{49·013} ₃₂₀	_{19·64} ₂₃₈	_{56·142} ₄₂₇	_{29·43} ₇₄	_{28·120} ₄₄₈	_{24·04} ₂₃₂
20·2	_{49·333} ₂₉₉	_{22·02} ₂₅₇	_{56·569} ₄₀₆	_{28·69} ₃₆	_{28·568} ₄₁₁	_{26·36} ₂₇₄
30·1	_{49·632} ₂₇₁	_{24·59} ₂₆₉	_{56·975} ₃₇₄	_{28·33} ₄	_{28·979} ₃₆₅	_{29·10} ₃₀₆
July 10·1	_{49·903} ₂₃₈	_{27·28} ₂₇₆	_{57·349} ₃₃₄	_{28·37} ₄₂	_{29·344} ₃₀₉	_{32·16} ₃₃₂
20·1	_{50·141} ₁₉₈	_{30·04} ₂₇₅	_{57·683} ₂₈₄	_{28·79} ₇₉	_{29·653} ₂₄₇	_{35·48} ₃₅₁
30·1	_{50·339} ₁₅₅	_{32·79} ₂₆₉	_{57·967} ₂₂₈	_{29·58} ₁₁₃	_{29·900} ₁₇₉	_{38·99} ₃₆₂
Aug. 9·0	_{50·494} ₁₁₀	_{35·48} ₂₅₈	_{58·195} ₁₆₇	_{30·71} ₁₄₁	_{30·079} ₁₁₀	_{42·61} ₃₆₄
19·0	_{50·604} ₆₄	_{38·06} ₂₄₂	_{58·362} ₁₀₃	_{32·12} ₁₆₄	_{30·189} ₃₉	_{46·25} ₃₅₉
28·9	_{50·668} ₁₉	_{40·48} ₂₂₁	_{58·465} ₃₉	_{33·76} ₁₈₀	_{30·228} ₃₀	_{49·84} ₃₄₇
Sept. 7·9	_{50·687} ₂₃	_{42·69} ₁₉₇	_{58·504} ₂₁	_{35·56} ₁₈₇	_{30·198} ₉₄	_{53·31} ₃₂₈
17·9	_{50·664} ₆₀	_{44·66} ₁₇₀	_{58·483} ₇₈	_{37·43} ₁₈₇	_{30·104} ₁₅₄	_{56·59} ₃₀₂
27·9	_{50·604} ₉₁	_{46·36} ₁₄₀	_{58·405} ₁₂₆	_{39·30} ₁₇₉	_{29·950} ₂₀₆	_{59·61} ₂₇₁
Oct. 7·9	_{50·513} ₁₁₆	_{47·76} ₁₀₉	_{58·279} ₁₆₆	_{41·09} ₁₆₂	_{29·744} ₂₅₁	_{62·32} ₂₃₂
17·8	_{50·397} ₁₃₅	_{48·85} ₇₅	_{58·113} ₁₉₄	_{42·71} ₁₃₈	_{29·493} ₂₈₆	_{64·64} ₁₈₉
27·8	_{50·262} ₁₄₆	_{49·60} ₄₁	_{57·919} ₂₁₁	_{44·09} ₁₀₇	_{29·207} ₃₁₂	_{66·53} ₁₄₀
Nov. 6·8	_{50·116} ₁₄₉	_{50·01} ₆	_{57·708} ₂₁₆	_{45·16} ₇₃	_{28·895} ₃₂₇	_{67·93} ₈₉
16·8	_{49·967} ₁₄₆	_{50·07} ₃₀	_{57·492} ₂₁₀	_{45·89} ₃₅	_{28·568} ₃₃₃	_{68·82} ₃₄
26·7	_{49·821} ₁₃₇	_{49·77} ₆₄	_{57·282} ₁₉₅	_{46·24} ₆	_{28·235} ₃₂₉	_{69·16} ₂₂
Dec. 6·7	_{49·684} ₁₂₄	_{49·13} ₉₆	_{57·087} ₁₇₀	_{46·18} ₄₇	_{27·906} ₃₁₄	_{68·94} ₇₈
16·7	_{49·560} ₁₀₆	_{48·17} ₁₂₆	_{56·917} ₁₃₉	_{45·71} ₈₅	_{27·592} ₂₈₉	_{68·16} ₁₃₂
26·7	_{49·454} ₈₃	_{46·91} ₁₅₂	_{56·778} ₁₀₂	_{44·86} ₁₂₃	_{27·303} ₂₅₅	_{66·84} ₁₈₁
36·6	_{49·371}	_{45·39}	_{56·676}	_{43·63}	_{27·048}	_{65·03}
Mean Place	47·753	27·02	53·596	44·77	27·400	38·92
Sec δ, Tan δ	1·103	+0·466	1·474	-1·084	1·880	+1·592
a, a'	+2·8	+17·5	+3·8	+17·5	+2·1	+17·7
b, b'	+0·03	+0·5	-0·06	+0·5	+0·09	+0·5
Authority and Catalogue No.	A.N.	1375	B.J.	1374	B.J.	1381

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name	θ Aquarii		α Tucanæ		γ Aquarii	
	4.32	Ko	2.91	K2	3.97	Ao
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ^m 22 13	[°] ['] —8 07	^h ^m 22 13	[°] ['] —60 35	^h ^m 22 18	[°] ['] —1 43
Jan. 1.6	10.552 ^s 41	48.06 42	46.28 ^s 16	95.62 ["] 194	04.475 ^s 46	75.20 ["] 68
11.6	10.511 16	48.48 33	46.12 10	93.68 232	04.429 23	75.88 64
21.6	10.495 9	48.81 22	46.02 4	91.36 263	04.406 2	76.52 56
31.6	10.504 37	49.03 7	45.98 3	88.73 286	04.408 30	77.08 44
Feb. 10.5	10.541 67	49.10 9	46.01 9	85.87 304	04.438 59	77.52 29
20.5	10.608 98	49.01 29	46.10 15	82.83 315	04.497 90	77.81 10
Mar. 2.5	10.706 130	48.72 50	46.25 22	79.68 319	04.587 122	77.91 12
12.5	10.836 162	48.22 73	46.47 28	76.49 316	04.709 154	77.79 37
22.4	10.998 194	47.49 96	46.75 34	73.33 307	04.863 188	77.42 63
Apr. 1.4	11.192 226	46.53 119	47.09 40	70.26 293	05.051 220	76.79 90
11.4	11.418 255	45.34 140	47.49 45	67.33 270	05.271 249	75.89 117
21.3	11.673 281	43.94 158	47.94 49	64.63 244	05.520 276	74.72 141
May 1.3	11.954 302	42.36 173	48.43 52	62.19 213	05.796 297	73.31 162
11.3	12.256 317	40.63 185	48.95 55	60.06 176	06.093 313	71.69 179
21.3	12.573 324	38.78 190	49.50 57	58.30 135	06.406 321	69.90 191
31.2	12.897 326	36.88 192	50.07 57	56.95 91	06.727 322	67.99 199
June 10.2	13.223 318	34.96 187	50.64 55	56.04 46	07.049 315	66.00 201
20.2	13.541 303	33.09 179	51.19 53	55.58 46	07.364 302	63.99 199
30.2	13.844 281	31.30 165	51.72 49	55.58 46	07.666 278	62.00 190
July 10.1	14.125 251	29.65 148	52.21 44	56.04 91	07.944 250	60.10 177
20.1	14.376 216	28.17 128	52.65 37	56.95 131	08.194 215	58.33 161
30.1	14.592 175	26.89 106	53.02 30	58.26 168	08.409 176	56.72 142
Aug. 9.0	14.767 133	25.83 83	53.32 22	59.94 198	08.585 134	55.30 121
19.0	14.900 89	25.00 59	53.54 14	61.92 220	08.719 91	54.09 98
28.9	14.989 45	24.41 36	53.68 5	64.12 235	08.810 48	53.11 75
Sept. 7.9	15.034 4	24.05 15	53.73 4	66.47 239	08.858 7	52.36 53
17.9	15.038 33	23.90 3	53.69 11	68.86 234	08.865 29	51.83 32
27.9	15.005 64	23.93 20	53.58 18	71.20 219	08.836 60	51.51 12
Oct. 7.9	14.941 89	24.13 33	53.40 24	73.39 195	08.776 85	51.39 5
17.9	14.852 107	24.46 43	53.16 29	75.34 163	08.691 103	51.44 21
27.8	14.745 118	24.89 50	52.87 32	76.97 122	08.588 114	51.65 33
Nov. 6.8	14.627 121	25.39 55	52.55 33	78.19 76	08.474 118	51.98 44
16.8	14.506 117	25.94 57	52.22 33	78.95 27	08.356 116	52.42 53
26.7	14.389 108	26.51 56	51.89 32	79.22 24	08.240 108	52.95 60
Dec. 6.7	14.281 94	27.07 55	51.57 28	78.98 76	08.132 95	53.55 65
16.7	14.187 77	27.62 52	51.29 24	78.22 124	08.037 79	54.20 68
26.7	14.110 55	28.14 44	51.05 20	76.98 170	07.958 59	54.88 68
36.6	14.055	28.58	50.85	75.28	07.899	55.56
Mean Place	11.618	38.83	47.482	75.07	05.557	67.91
Sec δ , Tan δ	1.010	—0.143	.2037	—1.775	1.000	—0.030
a, a'	+3.2	+17.9	+4.1	+17.9	+3.1	+18.1
b, b'	—0.01	+0.4	—0.11	+0.4	0.00	+0.4
Authority and Catalogue No.	B.J.	1386	B.J.	1387	B.J.	1391

APPARENT PLACES OF STARS, 1931.

507

AT UPPER TRANSIT AT GREENWICH.

Name	σ Aquarii		η Aquarii		κ Aquarii	
	4·89	Ao	4·13	B8	5·33	Ko
Mag. Spect.						
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 22	^m 26	^h 22	^m 31	^h 22	^m 34
		—II° 01'		—0° 28'		—4° 34'
Jan. 1·7	58 ^s ·836	63 ["] ·50	47 ^s ·616	31 ["] ·49	10 ^s ·027	71 ["] ·70
11·6	58·785	63·80	47·560	32·21	09·971	72·26
21·6	58·757	63·98	47·526	32·88	09·936	72·74
31·6	58·754	64·02	47·516	33·48	09·925	73·13
Feb. 10·6	58·779	63·90	47·532	33·98	09·940	73·38
20·5	58·832	63·61	47·576	34·32	09·983	73·48
Mar. 2·5	58·916	63·11	47·651	34·48	10·058	73·37
12·5	59·033	62·40	47·759	34·42	10·163	73·06
22·4	59·183	61·48	47·900	34·11	10·303	72·51
Apr. 1·4	59·367	60·35	48·075	33·53	10·477	71·70
11·4	59·583	59·00	48·283	32·68	10·684	70·65
21·4	59·830	57·46	48·523	31·56	10·924	69·35
May 1·3	60·105	55·76	48·791	30·19	11·191	67·84
11·3	60·404	53·92	49·082	28·59	11·482	66·14
21·3	60·719	52·02	49·391	26·81	11·791	64·30
31·3	61·045	50·07	49·711	24·89	12·112	62·36
June 10·2	61·373	48·15	50·034	22·87	12·436	60·37
20·2	61·697	46·28	50·352	20·82	12·756	58·37
30·2	62·008	44·53	50·658	18·79	13·064	56·44
July 10·1	62·298	42·94	50·943	16·83	13·352	54·60
20·1	62·561	41·54	51·201	14·98	13·614	52·92
30·1	62·789	40·36	51·427	13·28	13·843	51·41
Aug. 9·1	62·978	39·43	51·614	11·77	14·034	50·11
19·0	63·126	38·73	51·760	10·47	14·183	49·04
29·0	63·229†	38·29	51·863	09·40	14·291	48·20
Sept. 7·9	63·289	38·09	51·924	08·55	14·355	47·60
17·9	63·307	38·09	51·944	07·93	14·379	47·22
27·9	63·287	38·29	51·928	07·54	14·365	47·06
Oct. 7·9	63·233	38·64	51·879	07·35	14·319	47·09
17·9	63·153	39·11	51·804	07·34	14·246	47·27
27·8	63·053	39·67	51·710	07·50	14·153	47·60
Nov. 6·8	62·940	40·27	51·603	07·80	14·046	48·03
16·8	62·822	40·89	51·489	08·22	13·932	48·53
26·8	62·704	41·50	51·375	08·73	13·819	49·10
Dec. 6·7	62·594	42·07	51·267	09·32	13·710	49·70
16·7	62·495	42·59	51·169	09·98	13·611	50·32
26·7	62·412	43·04	51·085	10·67	13·526	50·92
36·7	62·348	43·38	51·017	11·38	13·458	51·49
Mean Place	59·814	53·71	48·638	24·97	11·007	63·99
Sec δ, Tan δ	1·019	—0·195	1·000	—0·008	1·003	—0·080
a, a'	+3·2	+18·4	+3·1	+18·6	+3·1	+18·7
b, b'	—0·01	+0·4	0·00	+0·4	0·00	+0·4
Authority and Catalogue No.	N.A.	1404	B.J.	1409	N.A.	1410

† First transit, Aug. 29.

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name	ζ Pegasi		β Gruis		η Pegasi	
	3·61	B8	2·24	Mb	3·10	Go
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ^m 22 37	[°] ['] +10 28	^h ^m 22 38	[°] ['] -47 14	^h ^m 22 39	[°] ['] +29 51
Jan. 1·7	60°056 ^s 67	11°83 ^s 106	32°549 ^s 116	63°98 ^s 122	44°478 ^s 103	38°76 ^s 153
11·6	59°989 47	10°77 112	32°433 80	62°76 158	44°375 79	37°23 175
21·6	59°942 23	09°65 113	32°353 42	61°18 190	44°296 52	35°48 190
31·6	59°919 3	08°52 108	32°311 —	59°28 219	44°244 21	33°58 198
Feb. 10·6	59°922 32	07°44 97	32°311 44	57°09 241	44°223 14	31°60 196
20·5	59°954 65	06°47 81	32°355 88	54°68 260	44°237 53	29°64 185
Mar. 2·5	60°019 98	05°66 58	32°443 134	52°08 273	44°290 93	27°79 166
12·5	60°117 133	05°08 33	32°577 180	49°35 281	44°383 136	26°13 139
22·4	60°250 170	04°75 2	32°757 227	46°54 284	44°519 178	24°74 104
Apr. 1·4	60°420 204	04°73 30	32°984 273	43°70 283	44°697 218	23°70 64
11·4	60°624 238	05°03 65	33°257 314	40°87 272	44°915 256	23°06 21
21·4	60°862 266	05°68 98	33°571 353	38°15 259	45°171 289	22°85 24
May 1·3	61°128 291	06°66 130	33°924 385	35°56 239	45°460 316	23°09 70
11·3	61°419 310	07°96 158	34°309 411	33°17 214	45°776 335	23°79 113
21·3	61°729 321	09°54 183	34°720 428	31°03 184	46°111 346	24°92 155
31·3	62°050 325	11°37 203	35°148 436	29°19 150	46°457 349	26°47 191
June 10·2	62°375 320	13°40 217	35°584 433	27°69 112	46°806 342	28°38 223
20·2	62°695 307	15°57 226	36°017 420	26°57 72	47°148 325	30°61 248
30·2	63°002 287	17°83 229	36°437 395	25°85 30	47°473 303	33°09 267
July 10·1	63°289 260	20°12 226	36°832 361	25°55 13	47°776 272	35°76 280
20·1	63°549 227	22°38 218	37°193 319	25°68 53	48°048 235	38°56 285
30·1	63°776 188	24°56 206	37°512 267	26°21 92	48°283 193	41°41 286
Aug. 9·1	63°964 148	26°62 189	37°779 209	27°13 126	48°476 149	44°27 280
19·0	64°112 106	28°51 171	37°988 148	28°39 156	48°625 102	47°07 268
29·0	64°218 63	30°22 149	38°136 86	29°95 179	48°727 57	49°75 252
Sept. 7·9	64°281 23	31°71 127	38°222 24	31°74 192	48°784 13	52°27 231
17·9	64°304 14	32°08 102	38°246 35	33°66 199	48°797 27	54°58 206
27·9	64°290 47	34°00 78	38°211 86	35°65 196	48°770 63	56°64 180
Oct. 7·9	64°243 73	34°78 54	38°125 132	37°61 186	48°707 92	58°44 148
17·9	64°170 93	35°32 31	37°993 167	39°47 167	48°615 116	59°92 114
27·8	64°077 108	35°63 8	37°826 192	41°14 139	48°499 133	61°06 79
Nov. 6·8	63°969 115	35°71 14	37°634 207	42°53 107	48°366 144	61°85 43
16·8	63°854 117	35°57 34	37°427 210	43°60 69	48°222 149	62°28 5
26·8	63°737 114	35°23 54	37°217 203	44°29 28	48°073 148	62°33 32
Dec. 6·7	63°623 105	34°69 72	37°014 189	44°57 14	47°925 141	62°01 69
16·7	63°518 94	33°97 87	36°825 166	44°43 57	47°784 129	61°32 103
26·7	63°424 78	33°10 99	36°659 137	43°86 99	47°655 113	60°29 134
36·7	63°346	32°11	36°522	42°87	47°542	58°95
Mean Place	61°146	14°79	33°366	45°25	45°830	35°87
Sec δ, Tan δ	1·017	+0·185	1·473	-1·082	1·153	+0·574
a, a'	+3·0	+18·8	+3·6	+18·8	+2·8	+18·8
b, b'	+0·01	+0·3	-0·07	+0·3	+0·04	+0·3
Authority and Catalogue No.	B.J.	1415	B.J.	1416	B.J.	1418

APPARENT PLACES OF STARS, 1931.

509

AT UPPER TRANSIT AT GREENWICH.

Name	ε Gruis		μ Pegasi		ι Cephei	
	3·69	Az	3·67	Ko	3·68	Ko
Mag. Spect.						
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 22 ^m 44	[°] —51 ['] 40	^h 22 ^m 46	[°] +24 ['] 14	^h 22 ^m 47	[°] +65 ['] 49
Jan. 1·7	23·030 ^s	67·86	38·949 ^s	14·33	10·20 ^s	85·70
11·6	22·887 ^s	66·51 ^s	38·856 ^s	12·97 ^s	09·82 ^s	84·07 ^s
21·6	22·782 ^s	64·76 ^s	38·784 ^s	11·42 ^s	09·48 ^s	81·96 ^s
31·6	22·720 ^s	62·67 ^s	38·736 ^s	09·76 ^s	09·21 ^s	79·45 ^s
Feb. 10·6	22·704 ^s	60·29 ^s	38·718 ^s	08·05 ^s	09·02 ^s	76·65 ^s
20·5	22·735 ^s	57·66 ^s	38·731 ^s	06·38 ^s	08·92 ^s	73·67 ^s
Mar. 2·5	22·815 ^s	54·84 ^s	38·780 ^s	04·83 ^s	08·91 ^s	70·63 ^s
12·5	22·946 ^s	51·90 ^s	38·867 ^s	03·47 ^s	08·99 ^s	67·66 ^s
22·5	23·129 ^s	48·88 ^s	38·994 ^s	02·37 ^s	09·17 ^s	64·89 ^s
Apr. 1·4	23·362 ^s	45·86 ^s	39·161 ^s	01·60 ^s	09·45 ^s	62·42 ^s
11·4	23·645 ^s	42·88 ^s	39·367 ^s	01·20 ^s	09·82 ^s	60·35 ^s
21·4	23·974 ^s	40·02 ^s	39·610 ^s	01·21 ^s	10·26 ^s	58·77 ^s
May 1·3	24·346 ^s	37·32 ^s	39·885 ^s	01·63 ^s	10·77 ^s	57·73 ^s
11·3	24·754 ^s	34·85 ^s	40·187 ^s	02·47 ^s	11·32 ^s	55·26 ^s
21·3	25·190 ^s	32·67 ^s	40·510 ^s	03·70 ^s	11·91 ^s	53·39 ^s
31·3	25·646 ^s	30·82 ^s	40·844 ^s	05·30 ^s	12·52 ^s	51·10 ^s
June 10·2	26·112 ^s	29·34 ^s	41·183 ^s	07·22 ^s	13·12 ^s	49·38 ^s
20·2	26·576 ^s	28·26 ^s	41·517 ^s	09·42 ^s	13·71 ^s	47·18 ^s
30·2	27·028 ^s	27·62 ^s	41·838 ^s	11·82 ^s	14·26 ^s	45·47 ^s
July 10·2	27·455 ^s	27·43 ^s	42·138 ^s	14·37 ^s	14·76 ^s	43·18 ^s
20·1	27·847 ^s	27·68 ^s	42·410 ^s	17·02 ^s	15·20 ^s	41·24 ^s
30·1	28·193 ^s	28·37 ^s	42·647 ^s	19·69 ^s	15·57 ^s	39·59 ^s
Aug. 9·1	28·485 ^s	29·46 ^s	42·845 ^s	22·33 ^s	15·86 ^s	37·14 ^s
19·0	28·716 ^s	30·90 ^s	43·001 ^s	24·89 ^s	16·07 ^s	35·83 ^s
29·0	28·881 ^s	32·65 ^s	43·113 ^s	27·31 ^s	16·20 ^s	34·57 ^s
Sept. 7·9	28·977 ^s	34·62 ^s	43·181 ^s	29·56 ^s	16·24 ^s	33·29 ^s
17·9	29·006 ^s	36·75 ^s	43·207 ^s	31·60 ^s	16·19 ^s	32·09 ^s
27·9	28·971 ^s	38·92 ^s	43·194 ^s	33·40 ^s	16·07 ^s	30·36 ^s
Oct. 7·9	28·878 ^s	41·05 ^s	43·146 ^s	34·93 ^s	15·87 ^s	29·57 ^s
17·9	28·733 ^s	43·06 ^s	43·069 ^s	36·17 ^s	15·61 ^s	28·47 ^s
27·9	28·549 ^s	44·86 ^s	42·969 ^s	37·11 ^s	15·29 ^s	27·98 ^s
Nov. 6·8	28·334 ^s	46·36 ^s	42·852 ^s	37·73 ^s	14·92 ^s	26·06 ^s
16·8	28·102 ^s	47·50 ^s	42·724 ^s	38·03 ^s	14·51 ^s	24·64 ^s
26·8	27·863 ^s	48·22 ^s	42·591 ^s	38·00 ^s	14·08 ^s	23·68 ^s
Dec. 6·7	27·629 ^s	48·50 ^s	42·459 ^s	37·65 ^s	13·63 ^s	22·15 ^s
16·7	27·409 ^s	48·31 ^s	42·332 ^s	36·98 ^s	13·19 ^s	21·02 ^s
26·7	27·212 ^s	47·65 ^s	42·215 ^s	36·02 ^s	12·76 ^s	20·30 ^s
36·7	27·046 ^s	46·55 ^s	42·112 ^s	34·80 ^s	12·35 ^s	19·01 ^s
Mean Place	23·799	48·31	40·171	12·76	13·101	74·26
Sec δ, Tan δ	1·613	—1·265	1·097	+0·450	2·443	+2·229
a, a'	+3·6	+19·0	+2·9	+19·0	+2·1	+19·0
b, b'	—0·08	+0·3	+0·03	+0·3	+0·14	+0·3
Authority and Catalogue No.	B.J.	1421	A.N.	1423	B.J.	1424

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name	λ Aquarii		δ Aquarii		α Piscis Australis (Fomalhaut)	
Mag. Spect.	3·84	Ma	3·51	A2	1·29	A3
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ₂₂ ^m ₄₈	[°] _{—7} ['] ₅₆	^h ₂₂ ^m ₅₀	[°] _{—10} ['] ₁₁	^h ₂₂ ^m ₅₃	[°] _{—29} ['] ₅₈
Jan. 1·7	60·036 ^s	58·06 ["]	58·610 ^s	28·23 ["]	49·780 ^s	92·54 ["]
11·6	59·971	58·48	58·542	28·35	49·697	92·13
21·6	59·926	58·79	58·495	28·29	49·637	91·44
31·6	59·903	58·98	58·470	28·05	49·603	90·48
Feb. 10·6	59·906	59·02	58·472	27·62	49·599	89·26
20·5	59·936	58·89	58·501	26·98	49·626	87·81
Mar. 2·5	59·995	58·56	58·561	26·14	49·686	86·13
12·5	60·087	58·01	58·654	25·08	49·783	84·26
22·5	60·213	57·23	58·781	23·82	49·917	82·23
Apr. 1·4	60·374	56·22	58·944	22·36	50·090	80·05
11·4	60·570	54·98	59·143	20·71	50·301	77·78
21·4	60·799	53·52	59·375	18·90	50·549	75·45
May 1·3	61·058	51·87	59·639	16·97	50·831	73·10
11·3	61·344	50·06	59·929	14·95	51·142	70·79
21·3	61·650	48·14	60·242	12·89	51·478	68·57
31·3	61·970	46·14	60·569	10·84	51·830	66·49
June 10·2	62·297	44·12	60·903	08·85	52·192	64·60
20·2	62·622	42·13	61·237	06·98	52·554	62·95
30·2	62·938	40·23	61·562	05·28	52·907	61·58
July 10·2	63·236	38·46	61·870	03·76	53·243	60·52
20·1	63·510	36·86	62·152	02·48	53·553	59·80
30·1	63·752	35·46	62·404	01·47	53·829	59·43
Aug. 9·1	63·957	34·30	62·618	00·73	54·066	59·40
19·0	64·123	33·38	62·791	00·27	54·257	59·70
29·0	64·246	32·72	62·920	00·09	54·401	60·31
Sept. 7·9	64·326	32·30	63·005	00·16	54·495	61·18
17·9	64·365	32·11	63·047	00·47	54·541	62·27
27·9	64·365	32·14	63·049	00·96	54·542	63·52
Oct. 7·9	64·332	32·35	63·014	01·61	54·502	64·86
17·9	64·270	32·70	62·950	02·36	54·427	66·22
27·9	64·186	33·17	62·863	03·17	54·324	67·54
Nov. 6·8	64·086	33·72	62·758	03·99	54·201	68·76
16·8	63·978	34·32	62·644	04·78	54·066	69·81
26·8	63·866	34·94	62·527	05·50	53·926	70·65
Dec. 6·7	63·757	35·56	62·412	06·13	53·789	71·25
16·7	63·656	36·14	62·305	06·63	53·660	71·58
26·7	63·566	36·67	62·210	07·00	53·545	71·62
36·7	63·491	37·13	62·130	07·21	53·448	71·38
Mean Place	60·913	49·69	59·425	17·40	50·509	77·85
Sec δ , Tan δ	1·010	—0·140	1·041	—0·290	1·155	—0·577
a, a'	+3·1	+19·1	+3·2	+19·1	+3·3	+19·2
b, b'	—0·01	+0·3	—0·02	+0·3	—0·04	+0·3
Authority and Catalogue No.	B. J.	1428	B. J.	1430	B. J.	1431

APPARENT PLACES OF STARS, 1931.

511

AT UPPER TRANSIT AT GREENWICH.

Name	β Piscium		β Pegasi		α Pegasi	
Mag. Spect.	4.58	B5p	2.61	Ma	2.57	Ao
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 23 ^m 00	[°] +3 ['] 26	^h 23 ^m 00	[°] +27 ['] 42	^h 23 ^m 01	[°] +14 ['] 49
Jan. 1.7	20.950 ^s	49.40 ["]	24.306 ^s	33.07 ["]	18.263 ^s	60.66 ["]
11.7	20.875 ⁷⁵	48.62 ⁷⁸	24.199 ¹⁰⁷	31.74 ¹³³	18.178 ⁸⁵	59.59 ¹⁰⁷
21.6	20.819 ⁵⁶	47.83 ⁷⁹	24.110 ⁸⁹	30.19 ¹⁵⁵	18.111 ⁶⁷	58.41 ¹¹⁸
31.6	20.783 ³⁶	47.10 ⁷³	24.045 ⁶⁵	28.48 ¹⁷¹	18.065 ⁴⁶	57.17 ¹²⁴
Feb. 10.6	20.770 ¹³	46.45 ⁶⁵	24.008 ³⁷	26.70 ¹⁷⁸	18.043 ²²	55.95 ¹²²
	15	53	4	179	7	116
20.5	20.785	45.92 ³⁶	24.004 ³²	24.91 ¹⁷¹	18.050 ³⁸	54.79 ¹⁰²
Mar. 2.5	20.829 ⁴⁴	45.56 ¹⁴	24.036 ⁷¹	23.20 ¹⁵³	18.088 ⁷⁴	53.77 ⁸³
12.5	20.907 ¹¹¹	45.42 ¹⁰	24.107 ¹¹³	21.67 ¹²⁹	18.162 ¹¹⁰	52.94 ⁵⁸
22.5	21.018 ¹⁴⁹	45.52 ³⁸	24.220 ¹⁵⁶	20.38 ⁹⁸	18.272 ¹⁴⁹	52.36 ²⁸
Apr. 1.4	21.167 ¹⁸⁴	45.90 ⁶⁵	24.376 ¹⁹⁷	19.40 ⁶¹	18.421 ¹⁸⁶	52.08 ⁵
11.4	21.351 ²¹⁹	46.55 ⁹⁵	24.573 ²³⁷	18.79 ²¹	18.607 ²²²	52.13 ³⁹
21.4	21.570 ²⁵¹	47.50 ¹²²	24.810 ²⁷³	18.58 ²²	18.829 ²⁵⁶	52.52 ⁷⁵
May 1.4	21.821 ²⁷⁸	48.72 ¹⁴⁸	25.083 ³⁰²	18.80 ⁶⁶	19.085 ²⁸⁴	53.27 ¹¹⁰
11.3	22.099 ³⁰⁰	50.20 ¹⁷¹	25.385 ³²⁶	19.46 ¹⁰⁷	19.369 ³⁰⁶	54.37 ¹⁴²
21.3	22.399 ³¹⁶	51.91 ¹⁸⁹	25.711 ³⁴⁰	20.53 ¹⁴⁶	19.675 ³²²	55.79 ¹⁷⁰
31.3	22.715 ³²²	53.80 ²⁰²	26.051 ³⁴⁷	21.99 ¹⁸²	19.997 ³²⁸	57.49 ¹⁹⁵
June 10.2	23.037 ³²³	55.82 ²¹⁰	26.398 ³⁴⁴	23.81 ²¹²	20.325 ³²⁷	59.44 ²¹⁵
20.2	23.360 ³¹⁴	57.92 ²¹³	26.742 ³³²	25.93 ²³⁷	20.652 ³¹⁸	61.59 ²²⁷
30.2	23.674 ²⁹⁷	60.05 ²¹¹	27.074 ³¹³	28.30 ²⁵⁶	20.970 ³⁰¹	63.86 ²³⁵
July 10.2	23.971 ²⁷⁴	62.16 ²⁰³	27.387 ²⁸⁶	30.86 ²⁶⁹	21.271 ²⁷⁶	66.21 ²³⁷
20.1	24.245 ²⁴⁴	64.19 ¹⁹¹	27.673 ²⁵²	33.55 ²⁷⁵	21.547 ²⁴⁵	68.58 ²³⁴
30.1	24.489 ²⁰⁹	66.10 ¹⁷⁴	27.925 ²¹³	36.30 ²⁷⁵	21.792 ²⁰⁹	70.92 ²²⁵
Aug. 9.1	24.698 ¹⁷⁰	67.84 ¹⁵⁶	28.138 ¹⁷²	39.05 ²⁶⁹	22.001 ¹⁷⁰	73.17 ²¹³
19.1	24.868 ¹³⁰	69.40 ¹³⁴	28.310 ¹²⁷	41.74 ²⁵⁹	22.171 ¹²⁸	75.30 ¹⁹⁶
29.0	24.998 ⁸⁷	70.74 ¹¹¹	28.437 ⁸³	44.33 ²⁴⁴	22.299 ⁸⁶	77.26 ¹⁷⁶
Sept. 7.9	25.085 ⁴⁹	71.85 ⁸⁸	28.520 ⁴⁰	46.77 ²²⁵	22.385 ⁴⁶	79.02 ¹⁵⁴
17.9	25.134 ¹⁰	72.73 ⁶⁵	28.560 ¹	49.02 ²⁰¹	22.431 ⁷	80.56 ¹³¹
27.9	25.144 ²³	73.38 ⁴²	28.559 ³⁷	51.03 ¹⁷⁶	22.438 ²⁶	81.87 ¹⁰⁶
Oct. 7.9	25.121 ⁵³	73.80 ²²	28.522 ⁶⁷	52.79 ¹⁴⁷	22.412 ⁵⁵	82.93 ⁸¹
17.9	25.068 ⁷³	74.02 ³	28.455 ⁹³	54.26 ¹¹⁶	22.357 ⁷⁸	83.74 ⁵⁵
27.9	24.995 ⁹²	74.05 ¹⁵	28.362 ¹¹³	55.42 ⁸³	22.279 ⁹⁶	84.29 ³¹
Nov. 6.8	24.903 ¹⁰²	73.90 ³⁰	28.249 ¹²⁶	56.25 ⁵⁰	22.183 ¹⁰⁷	84.60 ⁶
16.8	24.801 ¹⁰⁶	73.60 ⁴⁴	28.123 ¹³⁴	56.75 ¹⁵	22.076 ¹¹⁴	84.66 ¹⁸
26.8	24.695 ¹⁰⁸	73.16 ⁵⁵	27.989 ¹³⁷	56.90 ²⁰	21.962 ¹¹⁵	84.48 ⁴¹
Dec. 6.8	24.587 ¹⁰³	72.61 ⁶⁵	27.852 ¹³⁵	56.70 ⁵⁴	21.847 ¹¹¹	84.07 ⁶²
16.7	24.484 ⁹⁴	71.96 ⁷¹	27.717 ¹²⁷	56.16 ⁸⁷	21.736 ¹⁰⁴	83.45 ⁸²
26.7	24.390 ⁸³	71.25 ⁷⁶	27.590 ¹¹⁶	55.29 ¹¹⁶	21.632 ⁹²	82.63 ⁹⁹
36.7	24.307	70.49	27.474	54.13	21.540	81.64
Mean Place	21.857	53.79	25.510	29.77	19.282	61.33
Sec δ , Tan δ	1.002	+0.060	1.130	+0.525	1.035	+0.265
a, a'	+3.1	+19.4	+2.9	+19.4	+3.0	+19.4
b, b'	0.00	+0.3	+0.03	+0.3	+0.02	+0.3
Authority and Catalogue No.	N.A.	1436	B.J.	1437	B.J.	1438

† Second transit, Sept. 7.

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name	α^2 Aquarii		γ Tucanæ		γ Piscium	
Mag. Spect.	3.80	Ko	4.10	F2	3.85	Ko
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 23	^m 05	^h 23	^m 13	^h 23	^m 13
		[°] —21		[°] —58		[°] +2
		['] 32		['] 36		['] 54
Jan. 1.7	45.519 ^s	62.01 ["]	24.449 ^s	71.75 ["]	34.416 ^s	14.20 ["]
11.7	45.438	61.96 5	24.220 229	70.39 136	34.338 78	13.46 74
21.6	45.376 62	61.69 27	24.031 189	68.56 183	34.275 63	12.73 73
31.6	45.336 40	61.18 51	23.888 143	66.32 224	34.230 45	12.05 68
Feb. 10.6	45.322 14	60.45 73	23.796 92	63.72 260	34.208 22	11.45 60
	14	96	36	288	3	47
20.6	45.336	59.49 118	23.760	60.84 311	34.211	10.98 30
Mar. 2.5	45.381 45	58.31 140	23.781 21	57.73 327	34.244 33	10.68 10
12.5	45.459 78	56.91 160	23.862 81	54.46 327	34.310 66	10.58 14
22.5	45.573 114	55.31 178	24.006 144	51.10 336	34.410 100	10.72 41
Apr. 1.4	45.724 151	53.53 195	24.212 206	47.72 338	34.547 137	11.13 68
	188		269	333	174	
11.4	45.912 225	51.58 207	24.481 327	44.39 322	34.721 209	11.81 97
21.4	46.137 259	49.51 216	24.808 382	41.17 303	34.930 243	12.78 124
May 1.4	46.396 288	47.35 221	25.190 430	38.14 279	35.173 273	14.02 149
11.3	46.684 322	45.14 220	25.620 471	35.35 248	35.446 296	15.51 171
21.3	46.996 331	42.94 214	26.091 502	32.87 212	35.742 313	17.22 189
31.3	47.327 341	40.80 203	26.593 522	30.75 170	36.055 323	19.11 202
June 10.3	47.668 343	38.77 188	27.115 529	29.05 126	36.378 325	21.13 210
20.2	48.011 338	36.89 166	27.644 523	27.79 78	36.703 318	23.23 212
30.2	48.349 322	35.23 142	28.167 503	27.01 28	37.021 305	25.35 210
July 10.2	48.671 299	33.81 114	28.670 471	26.73 22	37.326 282	27.45 202
20.1	48.970 268	32.67 83	29.141 426	26.95 70	37.608 255	29.47 190
30.1	49.238 233	31.84 52	29.507 369	27.65 115	37.863 221	31.37 174
Aug. 9.1	49.471 191	31.32 21	29.936 304	28.80 157	38.084 184	33.11 154
19.1	49.662 148	31.11 9	30.240 230	30.37 192	38.268 144	34.65 132
29.0	49.810 102	31.20 37	30.470 152	32.29 220	38.412 102	35.97 109
Sept. 8.0	49.912† 57	31.57 61	30.622 73	34.49 239	38.514 63	37.06 86
17.9	49.969 15	32.18 80	30.695 5	36.88 249	38.577 25	37.92 63
27.9	49.984 22	32.98 95	30.690 78	39.37 247	38.602 9	38.55 40
Oct. 7.9	49.962 56	33.93 103	30.612 145	41.84 236	38.593 38	38.95 19
17.9	49.906 82	34.96 107	30.467 201	44.20 215	38.555 62	39.14 1
27.9	49.824 101	36.03 104	30.266 246	46.35 184	38.493 81	39.15 16
Nov. 6.8	49.723 114	37.07 96	30.020 278	48.19 145	38.412 93	38.99 31
16.8	49.609 121	38.03 84	29.742 297	49.64 100	38.319 101	38.68 44
26.8	49.488 121	38.87 69	29.445 303	50.64 50	38.218 103	38.24 54
Dec. 6.8	49.367 115	39.56 51	29.142 297	51.14 2	38.115 101	37.70 62
16.7	49.252 106	40.07 30	28.845 280	51.12 55	38.014 95	37.08 69
26.7	49.146 91	40.37 8	28.565 252	50.57 107	37.919 85	36.39 73
36.7	49.055	40.45	28.313	49.50	37.834	35.66
Mean Place	46.211	49.87	24.885	51.10	35.247	18.33
Sec δ , Tan δ	1.075	—0.395	1.920	—1.639	1.001	+0.051
a, a'	+3.2	+19.5	+3.5	+19.6	+3.1	+19.6
b, b'	—0.03	+0.2	—0.11	+0.2	0.00	+0.2
Authority and Catalogue No.	B.J.	1444	B.J.	1452	A.N.	1453

† First transit, Sept. 8.

APPARENT PLACES OF STARS, 1931.

513

AT UPPER TRANSIT AT GREENWICH.

Name Mag. Spect.	♊ Aquarii		♌ Pegasi		♋ Piscium	
	5·16	Ao	4·65	A5	4·94	A2p
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h 23	^m 15	^h 23	^m 17	^h 23	^m 23
		[°] —9		[°] +23		[°] +0
		['] 58		['] 21		['] 52
Jan. 1·7	21·640	85·41	12·034	47·73	22·901	35·33
11·7	21·561	85·78	11·928	46·58	22·819	34·65
21·6	21·497	86·02	11·838	45·23	22·749	34·01
31·6	21·453	86·10	11·768	43·76	22·697	33·43
Feb. 10·6	21·430	86·01	11·722	42·23	22·666	32·95
20·6	21·435	85·74	11·705	40·69	22·660	32·60
Mar. 2·5	21·468	85·25	11·722	39·24	22·682	32·43
12·5	21·532	84·55	11·776	37·95	22·736	32·46
22·5	21·632	83·62	11·870	36·88	22·825	32·72
Apr. 1·4	21·767	82·46	12·006	36·10	22·951	33·25
11·4	21·940	81·08	12·183	35·66	23·115	34·04
21·4	22·148	79·49	12·401	35·60	23·315	35·10
May 1·4	22·390	77·72	12·655	35·93	23·549	36·42
11·3	22·663	75·81	12·941	36·65	23·814	37·97
21·3	22·959	73·79	13·252	37·75	24·105	39·72
31·3	23·274	71·70	13·581	39·21	24·415	41·64
June 10·3	23·600	69·62	13·920	41·00	24·736	43·68
20·2	23·929	67·59	14·259	43·05	25·060	45·78
30·2	24·252	65·65	14·590	45·32	25·382	47·89
July 10·2	24·562	63·86	14·906	47·76	25·689	49·95
20·1	24·851	62·25	15·198	50·29	25·976	51·92
30·1	25·112	60·87	15·460	52·87	26·237	53·74
Aug. 9·1	25·340	59·74	15·686	55·43	26·465	55·39
19·1	25·529	58·88	15·873	57·93	26·656	56·84
29·0	25·679	58·28	16·018	60·31	26·808	58·06
Sept. 8·0	25·785	57·95	16·120	62·53	26·919	59·04
17·9	25·851	57·87	16·181	64·56	26·991	59·77
27·9	25·878	58·01	16·202	66·37	27·025	60·27
Oct. 7·9	25·869	58·35	16·187	67·93	27·024	60·55
17·9	25·828	58·84	16·142	69·23	26·993	60·63
27·9	25·764	59·44	16·070	70·25	26·937	60·54
Nov. 6·8	25·679	60·12	15·978	70·97	26·862	60·28
16·8	25·582	60·83	15·870	71·40	26·773	59·90
26·8	25·477	61·54	15·752	71·52	26·675	59·42
Dec. 6·8	25·370	62·22	15·628	71·34	26·573	58·85
16·7	25·266	62·84	15·505	70·86	26·472	58·22
26·7	25·168	63·38	15·385	70·10	26·375	57·56
36·7	25·081	63·81	15·273	69·09	26·286	56·89
Mean Place	22·353	77·09	13·076	44·98	23·659	39·80
Sec 8, Tan 8	1·015	—0·176	1·089	+0·432	1·000	+0·015
a, a'	+3·1	+19·7	+3·0	+19·7	+3·1	+19·8
b, b'	—0·01	+0·2	+0·03	+0·2	0·00	+0·2
Authority and Catalogue No.	N.A.	1455	B.J.	1457	B.J.	1464

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name		72 Pegasi <i>m</i> .		ι Phoenicis		ι Piscium	
Mag. Spect.		5.21	K2	4.80	A2p	4.28	F8
Mean Solar Date		R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
		^h 23 ^m 30	+30° 56'	^h 23 ^m 31	—42° 59'	^h 23 ^m 36	+5° 15'
Jan.	1.7	30.402 ^s ₁₂₈	45.38 ["] ₁₁₆	21.848 ^s ₁₄₇	65.60 ["] ₆₅	23.256 ^s ₈₉	05.56 ["] ₇₆
	11.7	30.274 ₁₁₅	44.22 ₁₄₁	21.701 ₁₂₅	64.95 ₁₀₆	23.167 ₇₈	04.80 ₇₇
	21.6	30.159 ₉₅	42.81 ₁₆₁	21.576 ₉₉	63.89 ₁₄₄	23.089 ₆₃	04.03 ₇₄
	31.6	30.064 ₇₀	41.20 ₁₇₅	21.477 ₆₇	62.45 ₁₇₉	23.026 ₄₃	03.29 ₆₈
Feb.	10.6	29.994 ₃₉	39.45 ₁₈₁	21.410 ₃₃	60.66 ₂₁₁	22.983 ₂₀	02.61 ₅₈
	20.6	29.955 ₄	37.64 ₁₇₈	21.377 ₇	58.55 ₂₃₇	22.963 ₈	02.03 ₄₃
Mar.	2.5	29.951 ₃₇	35.86 ₁₆₆	21.384 ₄₈	56.18 ₂₅₉	22.971 ₄₁	01.60 ₂₃
	12.5	29.988 ₈₀	34.20 ₁₄₇	21.432 ₉₂	53.59 ₂₇₆	23.012 ₇₆	01.37 ₁
	22.5	30.068 ₁₂₆	32.73 ₁₂₁	21.524 ₁₄₀	50.83 ₂₈₈	23.088 ₁₁₄	01.36 ₂₅
Apr.	1.5	30.194 ₁₇₂	31.52 ₈₇	21.664 ₁₈₅	47.95 ₂₉₅	23.202 ₁₅₂	01.61 ₅₃
	11.4	30.366 ₂₁₆	30.65 ₄₉	21.849 ₂₃₃	45.00 ₂₉₆	23.354 ₁₉₀	02.14 ₈₁
	21.4	30.582 ₂₅₆	30.16 ₈	22.082 ₂₇₇	42.04 ₂₉₁	23.544 ₂₂₇	02.95 ₁₁₀
May	1.4	30.838 ₂₉₂	30.08 ₃₅	22.359 ₃₁₇	39.13 ₂₇₈	23.771 ₂₅₉	04.05 ₁₃₇
	11.3	31.130 ₃₂₁	30.43 ₇₈	22.676 ₃₅₀	36.35 ₂₆₂	24.030 ₂₈₆	05.42 ₁₆₀
	21.3	31.451 ₃₄₁	31.21 ₁₁₈	23.026 ₃₇₉	33.73 ₂₃₈	24.316 ₃₀₇	07.02 ₁₈₁
	31.3	31.792 ₃₅₃	32.39 ₁₅₇	23.405 ₃₉₅	31.35 ₂₀₈	24.623 ₃₂₀	08.83 ₁₉₇
June	10.3	32.145 ₃₅₆	33.96 ₁₉₀	23.800 ₄₀₆	29.27 ₁₇₅	24.943 ₃₂₆	10.80 ₂₀₈
	20.2	32.501 ₃₄₉	35.86 ₂₁₉	24.206 ₄₀₄	27.52 ₁₃₇	25.269 ₃₂₂	12.88 ₂₁₄
	30.2	32.850 ₃₃₅	38.05 ₂₄₃	24.610 ₃₉₃	26.15 ₉₅	25.591 ₃₁₂	15.02 ₂₁₃
July	10.2	33.185 ₃₁₂	40.48 ₂₆₀	25.003 ₃₇₁	25.20 ₅₁	25.903 ₂₉₄	17.15 ₂₀₈
	20.2	33.497 ₂₈₁	43.08 ₂₇₁	25.374 ₃₄₀	24.69 ₈	26.197 ₂₆₈	19.23 ₁₉₈
	30.1	33.778 ₂₄₆	45.79 ₂₇₇	25.714 ₃₀₂	24.61 ₃₆	26.465 ₂₃₈	21.21 ₁₈₄
Aug.	9.1	34.024 ₂₀₅	48.56 ₂₇₆	26.016 ₂₅₅	24.97 ₇₇	26.703 ₂₀₂	23.05 ₁₆₆
	19.1	34.229 ₁₆₃	51.32 ₂₇₀	26.271 ₂₀₃	25.74 ₁₁₄	26.905 ₁₆₃	24.71 ₁₄₅
	29.0	34.392 ₁₁₈	54.02 ₂₅₉	26.474 ₁₄₈	26.88 ₁₄₇	27.068 ₁₂₄	26.16 ₁₂₃
Sept.	8.0	34.510 ₇₆	56.61 ₂₄₂	26.622 ₉₂	28.35 ₁₇₃	27.192 ₈₅	27.39 ₁₀₀
	17.9	34.586 ₃₄	59.03 ₂₂₃	26.714 ₃₇	30.08 ₁₉₁	27.277 ₄₇	28.39 ₇₆
	27.9	34.620 ₄	61.26 ₂₀₀	26.751 ₁₅	31.99 ₂₀₁	27.324 ₁₂	29.15 ₅₃
Oct.	7.9	34.616 ₃₈	63.26 ₁₇₄	26.736 ₆₁	34.00 ₂₀₂	27.336 ₁₉	29.68 ₃₂
	17.9	34.578 ₆₈	65.00 ₁₄₄	26.675 ₁₀₃	36.02 ₁₉₃	27.317 ₄₄	30.00 ₁₂
	27.9	34.510 ₉₂	66.44 ₁₁₂	26.572 ₁₃₃	37.95 ₁₇₇	27.273 ₆₅	30.12 ₇
Nov.	6.9	34.418 ₁₁₁	67.56 ₇₉	26.439 ₁₅₉	39.72 ₁₅₂	27.208 ₈₂	30.05 ₂₃
	16.8	34.307 ₁₂₅	68.35 ₄₄	26.280 ₁₇₃	41.24 ₁₂₁	27.126 ₉₂	29.82 ₃₇
	26.8	34.182 ₁₃₅	68.79 ₈	26.107 ₁₈₁	42.45 ₈₅	27.034 ₉₈	29.45 ₅₀
Dec.	6.8	34.047 ₁₃₉	68.87 ₂₈	25.926 ₁₈₁	43.30 ₄₅	26.936 ₁₀₁	28.95 ₅₉
	16.7	33.908 ₁₃₈	68.59 ₆₃	25.745 ₁₇₃	43.75 ₃	26.835 ₉₉	28.36 ₆₈
	26.7	33.770 ₁₃₃	67.96 ₉₆	25.572 ₁₆₀	43.78 ₄₀	26.736 ₉₄	27.68 ₇₄
	36.7	33.637	67.00	25.412		26.642	26.94
Mean Place		31.488	39.67	22.213	48.16	23.981	08.08
Sec δ, Tan δ		1.166	+0.600	1.367	—0.932	1.004	+0.092
<i>a</i> , <i>a'</i>		+3.0	+19.9	+3.2	+19.9	+3.1	+19.9
<i>b</i> , <i>b'</i>		+0.04	+0.1	—0.06	+0.1	+0.01	+0.1
Authority and Catalogue No.		A.N.	1471	N.A.	1474	B.J.	1479

APPARENT PLACES OF STARS, 1931.

515

AT UPPER TRANSIT AT GREENWICH.

Name	γ Cephei		λ Piscium		δ Sculptoris	
	3.42	Ko	4.61	A5	4.64	Ao
Mean Solar Date	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	^h ₂₃ ^m ₃₆	[°] ₊₇₇ ['] ₁₄	^h ₂₃ ^m ₃₈	[°] ₊₁ ['] ₂₃	^h ₂₃ ^m ₄₅	[°] ₋₂₈ ['] ₃₀
Jan. 1.7	^s _{25.52} 88	^s _{65.85} 81	^s _{30.794} 89	^s _{57.31} 67	^s _{19.704} 113	^s _{55.84} 9
11.7	_{24.64} 82	_{65.04} 139	_{30.705} 79	_{56.64} 64	_{19.591} 99	_{55.75} 40
21.7	_{23.82} 72	_{63.65} 192	_{30.626} 64	_{56.00} 58	_{19.492} 81	_{55.35} 72
31.6	_{23.10} 60	_{61.73} 238	_{30.562} 44	_{55.42} 49	_{19.411} 59	_{54.63} 102
Feb. 10.6	_{22.50} 46	_{59.35} 272	_{30.518} 21	_{54.93} 35	_{19.352} 33	_{53.61} 130
20.6	_{22.04} 29	_{56.63} 296	_{30.497} 6	_{54.58} 19	_{19.319} 2	_{52.31} 156
Mar. 2.5	_{21.75} 11	_{53.67} 306	_{30.503} 39	_{54.39} 1	_{19.317} 32	_{50.75} 181
12.5	_{21.64} 8	_{50.61} 304	_{30.542} 73	_{54.40} 24	_{19.349} 69	_{48.94} 203
22.5	_{21.72} 27	_{47.57} 289	_{30.615} 111	_{54.64} 50	_{19.418} 110	_{46.91} 222
Apr. 1.5	_{21.99} 44	_{44.68} 263	_{30.726} 149	_{55.14} 76	_{19.528} 151	_{44.69} 238
11.4	_{22.43} 61	_{42.05} 227	_{30.875} 187	_{55.90} 103	_{19.679} 192	_{42.31} 248
21.4	_{23.04} 75	_{39.78} 183	_{31.062} 223	_{56.93} 128	_{19.871} 232	_{39.83} 255
May 1.4	_{23.79} 86	_{37.95} 131	_{31.285} 256	_{58.21} 153	_{20.103} 269	_{37.28} 255
11.4	_{24.65} 96	_{36.64} 76	_{31.541} 283	_{59.74} 173	_{20.372} 301	_{34.73} 251
21.3	_{25.61} 102	_{35.88} 18	_{31.824} 304	_{61.47} 190	_{20.673} 325	_{32.22} 241
31.3	_{26.63} 104	_{35.70} 41	_{32.128} 318	_{63.37} 202	_{20.998} 344	_{29.81} 225
June 10.3	_{27.67} 104	_{36.11} 98	_{32.446} 324	_{65.39} 210	_{21.342} 354	_{27.56} 203
20.2	_{28.71} 102	_{37.09} 151	_{32.770} 322	_{67.49} 210	_{21.696} 355	_{25.53} 177
30.2	_{29.73} 96	_{38.60} 203	_{33.092} 311	_{69.59} 208	_{22.051} 347	_{23.76} 146
July 10.2	_{30.69} 88	_{40.63} 249	_{33.403} 294	_{71.67} 199	_{22.398} 330	_{22.30} 113
20.2	_{31.57} 78	_{43.12} 289	_{33.697} 270	_{73.66} 186	_{22.728} 305	_{21.17} 75
30.1	_{32.35} 66	_{46.01} 323	_{33.967} 238	_{75.52} 169	_{23.033} 273	_{20.42} 38
Aug. 9.1	_{33.01} 54	_{49.24} 350	_{34.205} 203	_{77.21} 148	_{23.306} 235	_{20.04} 1
19.1	_{33.55} 39	_{52.74} 370	_{34.408} 166	_{78.69} 125	_{23.541} 192	_{20.03} 36
29.1	_{33.94} 25	_{56.44} 381	_{34.574} 126	_{79.94} 102	_{23.733} 147	_{20.39} 69
Sept. 8.0	_{34.19} 16	_{60.25} 386	_{34.700} 86	_{80.96} 78	_{23.880} 100	_{21.08} 97
17.9	_{34.30} 4	_{64.11} 382	_{34.786} 49	_{81.74} 54	_{23.980} 56	_{22.05} 121
27.9	_{34.26} 19	_{67.93} 372	_{34.835} 14	_{82.28} 31	_{24.036} 14	_{23.26} 137
Oct. 7.9	_{34.07} 33	_{71.65} 352	_{34.849} 17	_{82.59} 11	_{24.050} 25	_{24.63} 148
17.9	_{33.74} 45	_{75.17} 325	_{34.832} 44	_{82.70} 8	_{24.025} 58	_{26.11} 150
27.9	_{33.29} 57	_{78.42} 290	_{34.788} 64	_{82.62} 23	_{23.967} 85	_{27.61} 147
Nov. 6.9	_{32.72} 68	_{81.32} 248	_{34.724} 81	_{82.39} 37	_{23.882} 105	_{29.08} 134
16.8	_{32.04} 77	_{83.80} 198	_{34.643} 91	_{82.02} 48	_{23.777} 119	_{30.42} 118
26.8	_{31.27} 84	_{85.78} 144	_{34.552} 99	_{81.54} 55	_{23.658} 128	_{31.60} 95
Dec. 6.8	_{30.43} 88	_{87.22} 84	_{34.453} 101	_{80.99} 63	_{23.530} 130	_{32.55} 69
16.8	_{29.55} 90	_{88.06} 21	_{34.352} 99	_{80.36} 65	_{23.400} 128	_{33.24} 40
26.7	_{28.65} 89	_{88.27} 41	_{34.253} 94	_{79.71} 67	_{23.272} 120	_{33.64} 10
36.7	_{27.76}	_{87.86}	_{34.159}	_{79.04}	_{23.152}	_{33.74}
Mean Place	29.773	49.83	31.470	61.09	20.084	42.51
Sec δ , Tan δ	4.530	+4.418	1.000	+0.024	1.138	-0.543
a, a'	+2.5	+19.9	+3.1	+20.0	+3.1	+20.0
b, b'	+0.29	+0.1	0.00	+0.1	-0.04	+0.1
Authority and Catalogue No.	B. J.	1480	N. A.	1482	B. J.	1488

† First transit, Sept. 18.

APPARENT PLACES OF STARS, 1931.

AT UPPER TRANSIT AT GREENWICH.

Name	ϕ Pegasi		27 Piscium		ω Piscium	
	5.23	Ma	5.07	Ko	4.03	I.5
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
Mean Solar Date						
	^h 23	^m 48	^h 23	^m 55	^h 23	^m 55
		+18° 44'		-3° 55'		+6° 28'
Jan. 1.7	57.649 ^s 108	16.29 91	07.874 ^s 94	84.63 55	45.338 ^s 97	51.52 73
11.7	57.541 98	15.38 106	07.780 85	85.18 46	45.241 89	50.79 76
21.7	57.443 85	14.32 117	07.695 73	85.64 35	45.152 76	50.03 74
31.6	57.358 66	13.15 122	07.622 56	85.99 21	45.076 60	49.29 69
Feb. 10.6	57.292 41	11.93 120	07.566 34	86.20 5	45.016 37	48.60 59
20.6	57.251 12	10.73 114	07.532 8	86.25 14	44.979 11	48.01 46
Mar. 2.6	57.239 23	09.59 100	07.524 22	86.11 34	44.968 20	47.55 28
12.5	57.262 61	08.59 80	07.546 57	85.77 58	44.988 55	47.27 7
22.5	57.323 102	07.79 54	07.603 94	85.19 82	45.043 94	47.20 18
Apr. 1.5	57.425 144	07.25 25	07.697 133	84.37 107	45.137 134	47.38 45
11.4	57.569 186	07.00 8	07.830 172	83.30 131	45.271 173	47.83 74
21.4	57.755 225	07.08 42	08.002 210	81.99 153	45.444 212	48.57 102
May 1.4	57.980 261	07.50 78	08.212 244	80.46 173	45.656 246	49.59 129
11.4	58.241 290	08.28 111	08.456 274	78.73 190	45.902 277	50.88 154
21.3	58.531 313	09.39 144	08.730 297	76.83 202	46.179 300	52.42 176
31.3	58.844 329	10.83 171	09.027 314	74.81 209	46.479 316	54.18 193
June 10.3	59.173 335	12.54 195	09.341 324	72.72 212	46.795 325	56.11 205
20.3	59.508 334	14.49 214	09.665 324	70.60 209	47.120 326	58.16 213
30.2	59.842 323	16.63 227	09.989 317	68.51 201	47.446 317	60.29 214
July 10.2	60.165 306	18.90 235	10.306 302	66.50 187	47.763 302	62.43 211
20.2	60.471 280	21.25 237	10.608 280	64.63 169	48.065 280	64.54 202
30.1	60.751 250	23.62 234	10.888 251	62.94 149	48.345 250	66.56 190
Aug. 9.1	61.001 215	25.96 225	11.139 219	61.45 125	48.595 218	68.46 173
19.1	61.216 176	28.21 214	11.358 182	60.20 99	48.813 181	70.19 153
29.1	61.392 136	30.35 197	11.540 143	59.21 73	48.994 142	71.72 131
Sept. 8.0	61.528 96	32.32 179	11.683 103	58.48 47	49.136 104	73.03 108
18.0	61.624 58	34.11 157	11.786 66	58.01 22	49.240 66	74.11 85
27.9	61.682 23	35.68 135	11.852 31	57.79 1	49.306 31	74.96 62
Oct. 7.9	61.705 10	37.03 111	11.883 2	57.80 20	49.337 28	75.58 40
17.9	61.695 37	38.14 85	11.881 30	58.00 36	49.337 28	75.98 20
27.9	61.658 61	38.99 61	11.851 52	58.36 49	49.309 50	76.18 —
Nov. 6.9	61.597 80	39.60 36	11.799 71	58.85 59	49.259 69	76.18 16
16.8	61.517 95	39.96 11	11.728 84	59.44 64	49.190 83	76.02 31
26.8	61.422 104	40.07 14	11.644 94	60.08 67	49.107 92	75.71 44
Dec. 6.8	61.318 110	39.93 38	11.550 98	60.75 67	49.015 98	75.27 54
16.8	61.208 112	39.55 60	11.452 100	61.42 64	48.917 101	74.73 64
26.7	61.096 110	38.95 80	11.352 98	62.06 59	48.816 98	74.09 70
36.7	60.986	38.15	11.254	62.65	48.718	73.39
Mean Place	58.449	13.70	08.407	79.57	45.964	52.90
Sec δ , Tan δ	1.056	+0.339	1.002	-0.069	1.006	+0.114
a, a'	+3.1	+20.0	+3.1	+20.0	+3.1	+20.0
b, b'	+0.02	0.0	0.00	0.0	+0.01	0.0
Authority and Catalogue No.	B.J.	1491	A.N.	1498	B.J.	1500

In the year 1931 there will be five eclipses, three of the Sun and two of the Moon.

I.—*A Total Eclipse of the Moon*, 1931 April 2, visible at Greenwich; the beginning visible generally in the western part of the Pacific Ocean, Asia, Australia, the Indian Ocean, Europe, and Africa; the ending visible generally in Asia except the eastern part, the Indian Ocean, Europe, Africa, the Atlantic Ocean, and the eastern part of South America.

ELEMENTS OF THE ECLIPSE.

G.M.T. of Opposition in Right Ascension, April 2^d 19^h 55^m 53^s.4

Sun's Right Ascension	00	44	32 ^s .94
Hourly motion			9.10
Moon's Right Ascension	12	44	32 ^s .94
Hourly motion			133 ^s .54
Sun's Declination	+ 4	47	23 ^s .3
Hourly motion	+ ..	0	57 ^s .7
Moon's Declination	- 4	33	11 ^s .0
Hourly motion	- ..	17	53 ^s .9
Sun's equatorial horizontal parallax			8.8
Sun's true semidiameter		15	59.8
Moon's equatorial horizontal parallax		61	03.8
Moon's true semidiameter		16	37.5

CIRCUMSTANCES OF THE ECLIPSE.

Moon enters penumbra	April	2	17	27 ^m .2
Moon enters umbra		2	18	23.2
Total eclipse begins		2	19	22.3
Middle of the eclipse		2	20	07.4
Total eclipse ends		2	20	52.6
Moon leaves umbra		2	21	51.7
Moon leaves penumbra		2	22	48.0

Contacts of Umbra with Moon's Limb.	Angles of Position from the North Point.	The Moon being in the Zenith in Longitude. Latitude.	
First	130°	- 84° 20'	- 4° 06'
Last	287	- 34 00	- 5 08

Magnitude of the eclipse = 1.509 (Moon's diameter = 1.0).

II.—*A Partial Eclipse of the Sun*, 1931 April 17–18, invisible at Greenwich.

ELEMENTS OF THE ECLIPSE.

G.M.T. of Conjunction in Right Ascension, April 18^d 01^h 59^m 22^s.4

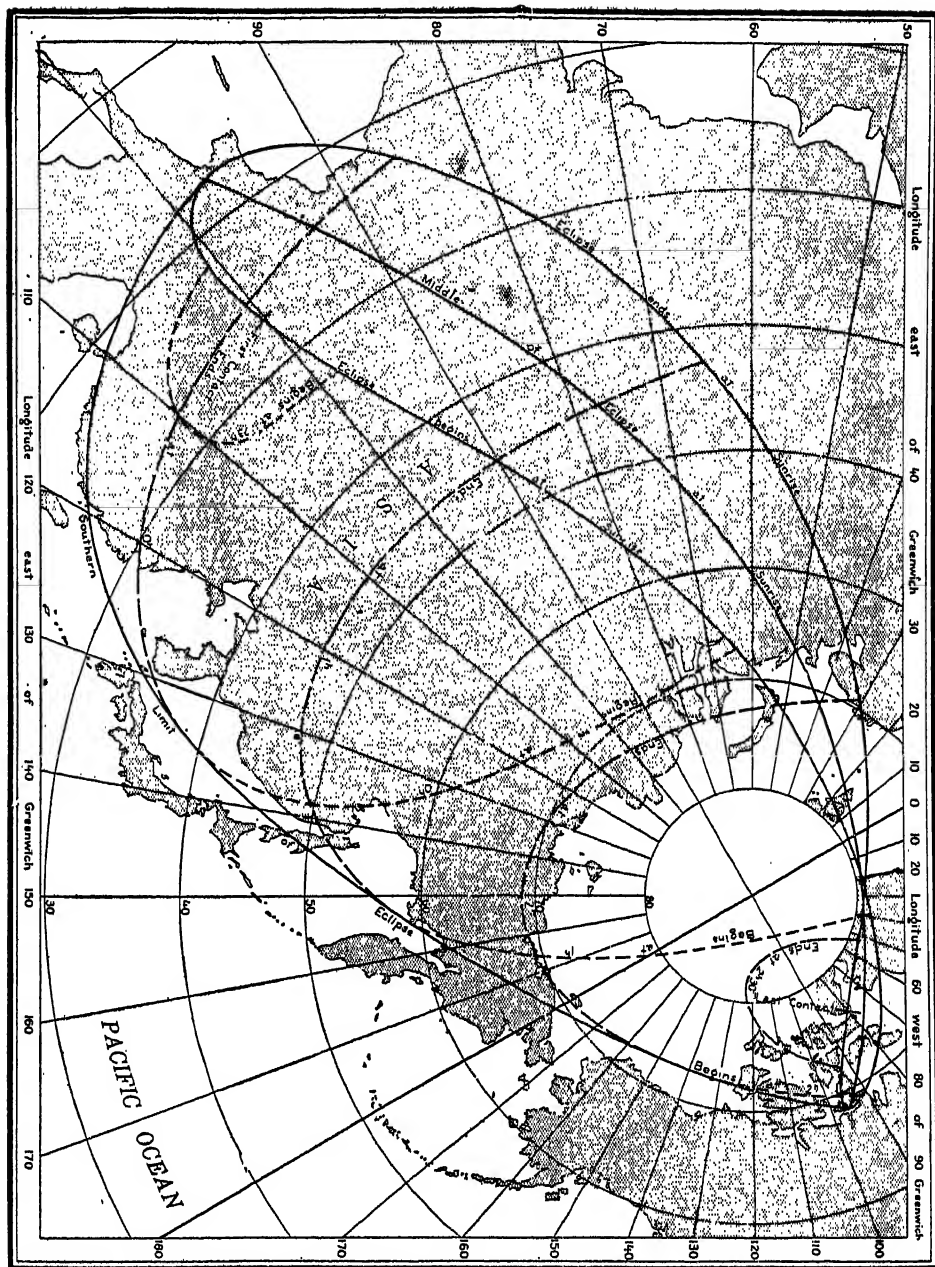
Sun and Moon's Right Ascension	..	..	..	01 ^h	40 ^m	31 ^s .64
Sun's hourly motion	..	..	..	..	..	9.27
Moon's hourly motion	..	..	..	..	..	111.58
Sun's Declination	..	..	..	.. +	10 ^o	26 ['] 19 ["] .7
Hourly motion	..	..	..	.. +	..	52.8
Moon's Declination	..	..	..	.. +	11 ^o	43 ['] 33 ["] .7
Hourly motion	..	..	..	.. +	13 [']	28.5
Sun's equatorial horizontal parallax	..	..	..	..	..	8.8
Sun's true semidiameter	..	..	..	..	15 [']	55.6
Moon's equatorial horizontal parallax	..	..	..	..	54 [']	44.3
Moon's true semidiameter	..	..	..	..	14 [']	54.2

CIRCUMSTANCES OF THE ECLIPSE.

		G.M.T.			Longitude.		Latitude.	
Eclipse begins	..	April	17 ^d	22 ^h 57 ^m .4	-100 ^o	15 [']	+26 ^o	52 [']
Greatest eclipse	..	..	18	00 45.1	- 58	44	+61	38
Eclipse ends	..	..	18	02 32.3	+ 80	01	+76	06

Magnitude of greatest eclipse = 0.511 (Sun's diameter = 1.0).

PARTIAL ECLIPSE OF 1931 APRIL 17-18.



BESSELIAN ELEMENTS OF THE PARTIAL ECLIPSE OF THE SUN,
1931 APRIL 17-18.

Greenwich Mean Time.	Co-ordinates of Centre of Shadow on Fundamental Plane.		Direction of Axis of Shadow.			Radius of Penumbra on Fundamental Plane.
	x	y	Log sin d	Log cos d	μ	l_1
^h 22 ^m 50	-1.44734	+0.68684	9.25614	9.99282	162° 35' 1	+0.56492
23 00	-1.37094	+0.72532	9.25624	9.99282	165 05.1	+0.56491
10	1.29454	0.76379	9.25634	9.99281	167 35.1	0.56490
20	1.21813	0.80226	9.25643	9.99281	170 05.2	0.56489
30	1.14172	0.84073	9.25653	9.99281	172 35.2	0.56488
40	1.06531	0.87919	9.25663	9.99280	175 05.2	0.56488
50	0.98889	0.91764	9.25673	9.99280	177 35.3	0.56487
00 00	-0.91247	+0.95609	9.25682	9.99280	180 05.3	+0.56486
10	0.83605	0.99454	9.25692	9.99279	182 35.3	0.56485
20	0.75963	1.03298	9.25702	9.99279	185 05.4	0.56483
30	0.68320	1.07141	9.25712	9.99278	187 35.4	0.56482
40	0.60677	1.10984	9.25721	9.99278	190 05.5	0.56481
50	0.53033	1.14826	9.25731	9.99278	192 35.5	0.56480
01 00	-0.45390	+1.18668	9.25741	9.99278	195 05.5	+0.56478
10	0.37746	1.22509	9.25750	9.99277	197 35.6	0.56477
20	0.30102	1.26350	9.25760	9.99277	200 05.6	0.56475
30	0.22457	1.30191	9.25770	9.99277	202 35.6	0.56474
40	0.14812	1.34030	9.25779	9.99276	205 05.7	0.56472
50	-0.07167	1.37868	9.25789	9.99276	207 35.7	0.56471
02 00	+0.00478	+1.41707	9.25799	9.99276	210 05.8	+0.56469
10	0.08124	1.45544	9.25808	9.99275	212 35.8	0.56467
20	0.15770	1.49381	9.25818	9.99275	215 05.8	0.56465
30	0.23417	1.53218	9.25828	9.99275	217 35.9	0.56463
40	+0.31063	+1.57054	9.25837	9.99274	220 05.9	+0.56461
Greenwich Mean Time.	Log x' for 1 Minute.		Log y' for 1 Minute.		Log μ' for 1 Minute.	Log Tangent of Angle of Cone.
						Penumbra.
^h 22 ^m 00	7.8830		7.5855		1.1762	7.66813
23 00	7.8831		7.5852		1.1762	7.66812
00 00	7.8832		7.5849		1.1762	7.66812
01 00	7.8833		7.5845		1.1762	7.66811
02 00	7.8834		7.5841		1.1762	7.66811
03 00	7.8835		7.5837		1.1762	7.66810

ECLIPSES, 1931.

III.—A Partial Eclipse of the Sun, 1931 September 12, invisible at Greenwich.

ELEMENTS OF THE ECLIPSE.

G.M.T. of Conjunction in Right Ascension, September 12^d 03^h 16^m 58^s.8

Sun and Moon's Right Ascension	..	..	..	..	11 ^h 17 ^m 21 ^s .21
Hourly motions	..	..	..	..	..8 ^s .99 and 135 ^s .00
Sun's Declination	..	..	..	..	..+ 4° 35' 18 ^{''} .3
Hourly motion	..	..	..	..	..— 57 ^{''} .1
Moon's Declination	..	..	..	..	..+ 6° 19' 56 ^{''} .1
Hourly motion	..	..	..	..	..— 17' 52 ^{''} .6
Sun's equatorial horizontal parallax	..	..	..	..	8 ^{''} .7
Sun's true semidiameter	..	..	..	..	15 53 ^{''} .5
Moon's equatorial horizontal parallax	..	..	..	..	61 15 ^{''} .0
Moon's true semidiameter	..	..	..	..	16 40 ^{''} .6

CIRCUMSTANCES OF THE ECLIPSE.

	G.M.T.	Longitude.	Latitude.
Eclipse begins	.. .. Sept. 12 ^d 04 ^h 13 ^m .1	+140° 27'	+71° 18'
Greatest eclipse	.. .. 12 04 40.9	+152 39	+61 24
Eclipse ends	.. .. 12 05 09.3	+162 29	+51 10

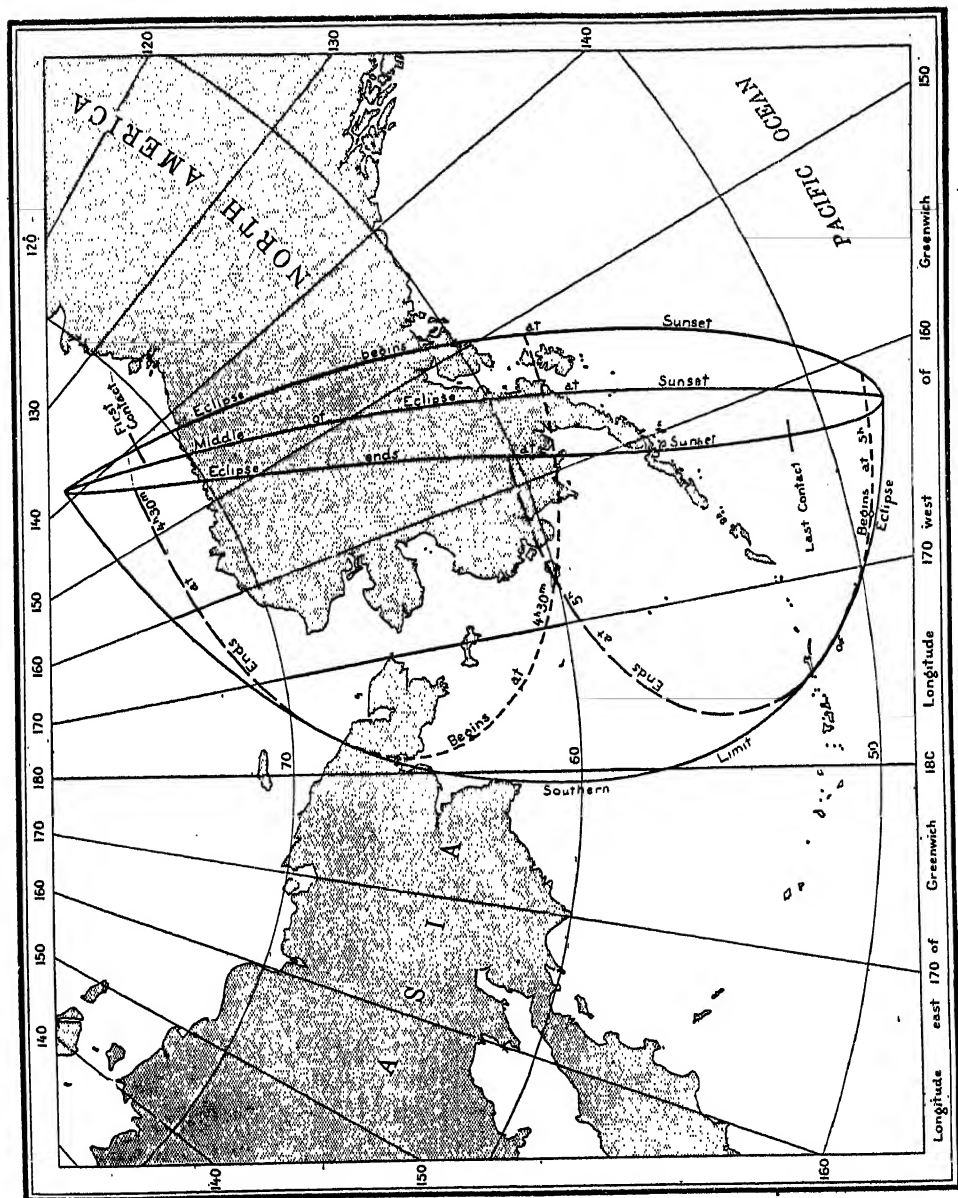
Magnitude of greatest eclipse = 0.047 (Sun's diameter = 1.0).

BESSELIAN ELEMENTS OF THE ECLIPSE.

Greenwich Mean Time.	Co-ordinates of Centre of Shadow on Fundamental Plane.		Direction of Axis of Shadow.			Radius of Penumbra on Fundamental Plane.
	<i>x</i>	<i>y</i>	Log sin <i>d</i>	Log cos <i>d</i>	<i>μ</i>	<i>l</i> ₁
^h ^m 04 10	+0.45283	+1.46720	8.90141	9.99862	243° 20.3	+0.53289
20	0.53823	1.42098	8.90117	9.99862	245 50.3	0.53289
30	0.62363	1.37476	8.90093	9.99862	248 20.4	0.53288
40	0.70902	1.32853	8.90069	9.99862	250 50.4	0.53288
50	0.79442	1.28230	8.90045	9.99862	253 20.5	0.53287
05 00	+0.87981	+1.23606	8.90021	9.99862	255 50.5	+0.53287
10	+0.96519	+1.18981	8.89997	9.99863	258 20.6	+0.53286

Greenwich Mean Time.	Log <i>x'</i> for 1 Minute.	Log <i>y'</i> for 1 Minute.	Log <i>μ'</i> for 1 Minute.	Log Tangent of Angle of Cone.
	Penumbra.			
^h ^m 04 00	7.9315	7.6647 <i>n</i>	1.1762	7.66702
05 00	7.9314	7.6650 <i>n</i>	1.1762	7.66702
06 00	7.9313	7.6652 <i>n</i>	1.1762	7.66703

PARTIAL ECLIPSE OF 1931 SEPTEMBER 12.



IV.—*A Total Eclipse of the Moon*, 1931 September 26, visible at Greenwich ; the beginning visible generally in the western part of the Pacific Ocean, Asia, Australia, the Indian Ocean, Europe, and Africa except the north-western part ; the ending visible generally in Asia except the north-eastern part, the Indian Ocean, Europe, Africa, the Atlantic Ocean, and the eastern part of South America.

ELEMENTS OF THE ECLIPSE.

G.M.T. of Opposition in Right Ascension, September 26^d 19^h 30^m 00^s.9

Sun's Right Ascension	12 ^h	10 ^m	03 ^s .28
Hourly motion			9.00
Moon's Right Ascension	00	10	03.28
Hourly motion			103.89
Sun's Declination	— 1°	05'	24".1
Hourly motion	—		58.5
Moon's Declination	+ 0	48'	42".9
Hourly motion	+	14'	13".6
Sun's equatorial horizontal parallax			8.8
Sun's true semidiameter		15'	57".4
Moon's equatorial horizontal parallax		53'	58".4
Moon's true semidiameter		14'	41".7

CIRCUMSTANCES OF THE ECLIPSE.

Moon enters penumbra	Sept. 26 ^d	16 ^h	40 ^m .7
Moon enters umbra	26	17	54.2
Total eclipse begins	26	19	05.5
Middle of the eclipse	26	19	48.0
Total eclipse ends	26	20	30.5
Moon leaves umbra	26	21	41.8
Moon leaves penumbra	26	22	55.3

Contacts of Umbra with Moon's Limb.	Angles of Position from the North Point.	The Moon being in the Zenith in Longitude. Latitude.	
First	45°	— 88° 41'	+ 0° 26'
Last	257	— 33 18	+ 1 20

• Magnitude of the eclipse = 1.326 (Moon's diameter = 1.0).

ECLIPSES, 1931.

V.—*A Partial Eclipse of the Sun*, 1931 October 11, invisible at Greenwich.

ELEMENTS OF THE ECLIPSE.

G.M.T. of Conjunction in Right Ascension, October 11^d 13^h 53^m 19^s·3

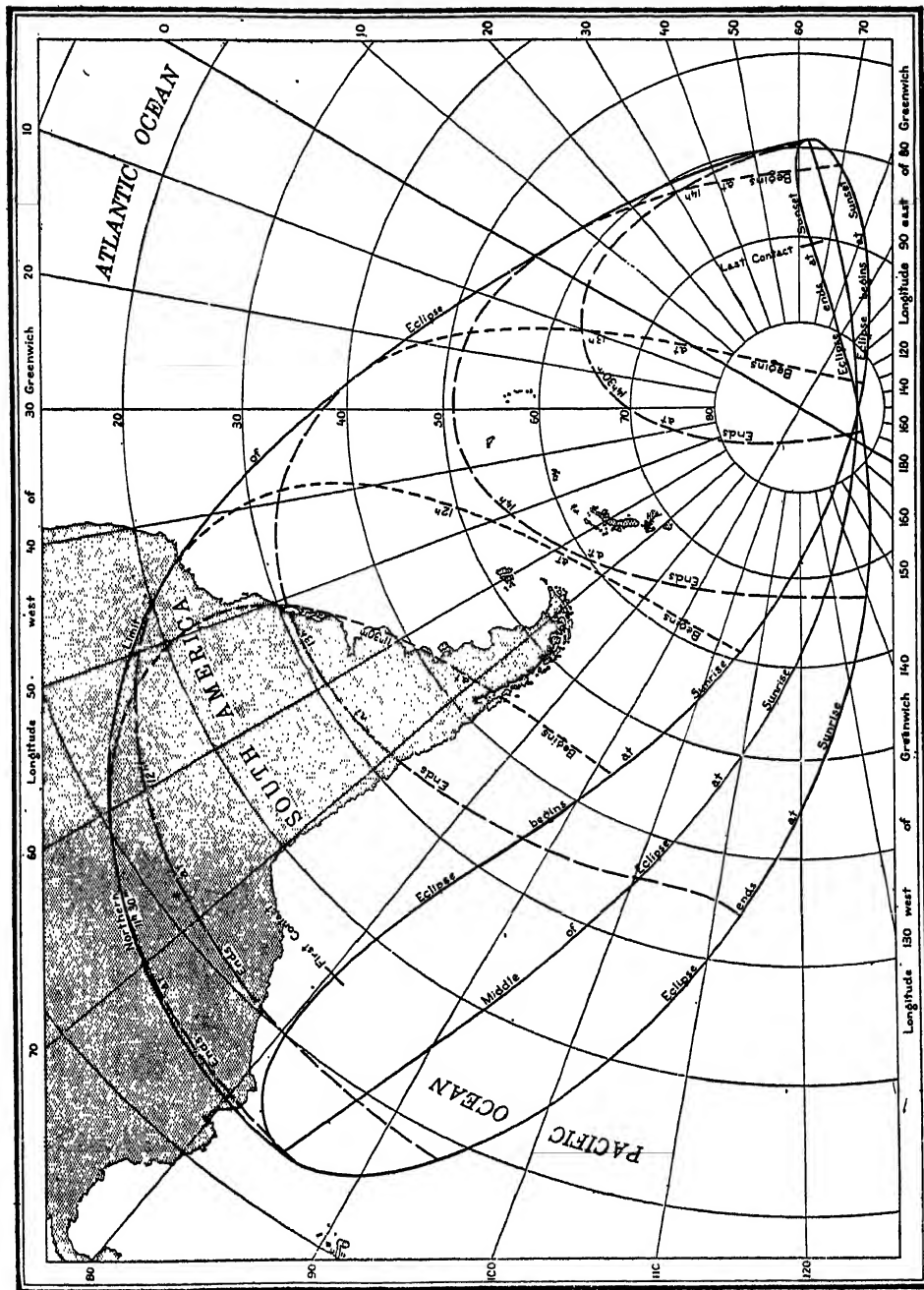
Sun and Moon's Right Ascension	..	..	..	13 ^h	03 ^m	43 ^s ·73
Sun's hourly motion	..	..	..	..	..	9·21
Moon's hourly motion	..	..	..	..	..	136·43
Sun's Declination	..	..	..	..	— 6°	47' 26 ^{''} ·6
Hourly motion	..	..	..	..	..	— 56·8
Moon's Declination	..	..	..	..	— 8°	00' 59·8
Hourly motion	..	..	..	..	..	— 17' 42·3
Sun's equatorial horizontal parallax	..	..	..	..	..	8·8
Sun's true semidiameter	..	..	..	..	16	01·4
Moon's equatorial horizontal parallax	..	..	..	..	61	20·9
Moon's true semidiameter	..	..	..	..	16	42·2

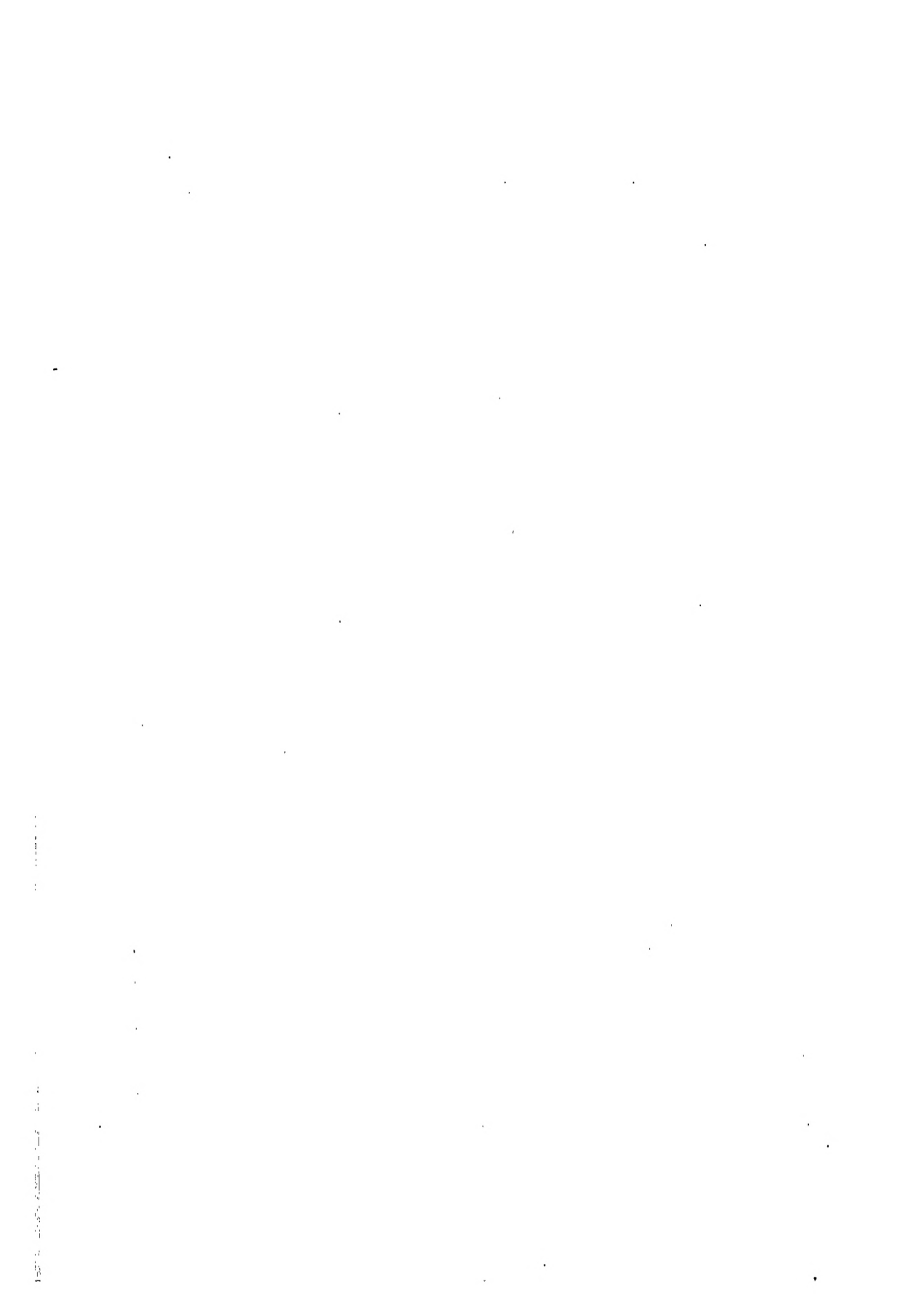
CIRCUMSTANCES OF THE ECLIPSE.

			G.M.T.	Longitude.	Latitude.
Eclipse begins	..	..	Oct. 11 ^d 11 ^h 01 ^m ·0	+ 80° 24'	— 15° 40'
Greatest eclipse	..	..	11 12 55·2	+ 119 37	— 61 22
Eclipse ends	..	..	11 14 48·9	— 64 30	— 70 46

Magnitude of greatest eclipse = 0·898 (Sun's diameter = 1·0).

PARTIAL ECLIPSE OF 1931 OCTOBER 11





BESSELIAN ELEMENTS OF THE PARTIAL ECLIPSE OF THE SUN,
1931 OCTOBER 11.

Greenwich Mean Time.	Co-ordinates of Centre of Shadow on Fundamental Plane.		Direction of Axis of Shadow.			Radius of Penumbra on Funda- mental Plane.
	x	y	Log sin d	Log cos d	μ	l_1
h m						
11 00	-1.48620	-0.40978	9.06980 <i>n</i>	9.99698	348 14.8	+0.53459
10	1.40048	0.45552	9.06996 <i>n</i>	9.99698	350 44.9	0.53460
20	1.31476	0.50125	9.07012 <i>n</i>	9.99698	353 14.9	0.53461
30	1.22903	0.54697	9.07028 <i>n</i>	9.99698	355 45.0	0.53462
40	1.14330	0.59269	9.07044 <i>n</i>	9.99698	358 15.0	0.53463
50	1.05756	0.63841	9.07061 <i>n</i>	9.99697	0 45.0	0.53464
12 00	-0.97182	-0.68412	9.07077 <i>n</i>	9.99697	3 15.1	+0.53465
10	0.88608	0.72983	9.07093 <i>n</i>	9.99697	5 45.1	0.53466
20	0.80033	0.77553	9.07109 <i>n</i>	9.99697	8 15.2	0.53467
30	0.71458	0.82123	9.07125 <i>n</i>	9.99696	10 45.2	0.53467
40	0.62883	0.86692	9.07141 <i>n</i>	9.99696	13 15.2	0.53468
50	0.54307	0.91261	9.07157 <i>n</i>	9.99696	15 45.3	0.53468
13 00	-0.45732	-0.95829	9.07173 <i>n</i>	9.99696	18 15.3	+0.53469
10	0.37155	1.00397	9.07189 <i>n</i>	9.99695	20 45.4	0.53469
20	0.28579	1.04964	9.07205 <i>n</i>	9.99695	23 15.4	0.53469
30	0.20003	1.09531	9.07221 <i>n</i>	9.99695	25 45.4	0.53469
40	0.11426	1.14097	9.07237 <i>n</i>	9.99695	28 15.5	0.53470
50	-0.02849	1.18662	9.07254 <i>n</i>	9.99695	30 45.5	0.53470
14 00	+0.05728	-1.23227	9.07270 <i>n</i>	9.99694	33 15.6	+0.53470
10	0.14305	1.27791	9.07286 <i>n</i>	9.99694	35 45.6	0.53470
20	0.22883	1.32354	9.07302 <i>n</i>	9.99694	38 15.6	0.53470
30	0.31460	1.36917	9.07318 <i>n</i>	9.99694	40 45.7	0.53470
40	0.40037	1.41479	9.07334 <i>n</i>	9.99693	43 15.7	0.53469
50	+0.48615	-1.46040	9.07350 <i>n</i>	9.99693	45 45.8	+0.53469

Greenwich Mean Time.	Log x' for 1 Minute.	Log y' for 1 Minute.	Log μ' for 1 Minute.	Log Tangent of Angle of Cone.
				Penumbra.
h m				
11 00	7.9331	7.6603 <i>n</i>	1.1762	7.67059
12 00	7.9332	7.6600 <i>n</i>	1.1762	7.67060
13 00	7.9333	7.6597 <i>n</i>	1.1762	7.67060
14 00	7.9333	7.6594 <i>n</i>	1.1762	7.67061
15 00	7.9334	7.6590 <i>n</i>	1.1762	7.67061

524 MEAN PLACES OF OCCULTATION STARS, 1931.

MEAN PLACES FOR 1931-0. (January 1^d.322, Greenwich Mean Time.)

Name of Star.		Magni- tude.	Right Ascension.			Annual Proper Motion.	Declination.	Annual Proper Motion.
			h	m	s	s	° ' "	"
80 B.	Piscium..	6.3	00	01	31.579	+0.0037	- 0 53 09.86	-0.05..
98 B.	Piscium..	6.3	00	14	14.966	+0.0051	+ 1 18 18.85	+0.012
60	Piscium..	6.2	00	43	49.406	+0.0010	6 21 53.25	-0.005
62	Piscium..	6.1	00	44	42.483	+0.0070	6 55 24.72	+0.008
147 B.	Piscium..	5.9	00	44	45.566	+0.0483	4 55 34.78	-1.132
171 B.	Piscium..	6.3	00	56	14.910	+0.0008	+ 6 06 40.98	-0.005
73	Piscium..	6.2	01	01	18.043	+0.0022	5 17 12.85	-0.008
88	Piscium..	6.2	01	11	06.909	-0.0011	6 37 50.12	-0.026
π	Piscium..	5.6	01	33	26.239	-0.0049	11 47 20.63	+0.035
26 B.	Arietis ..	6.0	01	55	44.011	-0.0003	11 57 39.60	-0.029
12 H ¹ .	Arietis ..	6.3	01	58	52.015	-0.0009	+13 08 40.79	-0.006
19	Arietis ..	5.8	02	09	17.273	+0.0071	14 57 26.16	-0.022
27	Arietis ..	6.4	02	27	04.554	+0.0029	17 23 58.23	-0.089
μ	Arietis ..	5.7	02	38	28.288	+0.0023	19 43 06.82	-0.038
36	Arietis ..	6.5	02	40	27.895	+0.0036	17 28 21.75	-0.040
40	Arietis ..	6.0	02	44	39.731	+0.0030	+17 59 50.98	-0.020
π	Arietis ..	5.2	02	45	26.295	+0.0004	17 10 41.99	-0.011
45	Arietis ..	6.0	02	51	55.578	-0.0011	18 03 11.65	-0.006
47	Arietis ..	5.8	02	54	07.978	+0.0160	20 23 35.66	-0.021
ζ	Arietis ..	4.8	03	10	55.863	-0.0019	20 47 23.22	-0.082
63	Arietis ..	5.2	03	18	46.723	-0.0032	+20 29 47.72	-0.009
65	Arietis ..	6.0	03	20	27.179	+0.0006	20 33 35.44	-0.008
66	Arietis ..	6.1	03	24	24.339	+0.0006	22 34 02.45	-0.112
7	Tauri ..	5.9	03	30	21.217	+0.0013	24 14 03.45	-0.023
16	Tauri ..	5.4	03	40	41.837	+0.0009	24 04 25.16	-0.049
18	Tauri ..	5.6	03	41	02.406	+0.0004	+24 37 27.19	-0.038
q	Tauri ..	4.3	03	41	05.742	+0.0010	24 15 08.29	-0.034
20	Tauri ..	4.1	03	41	43.010	+0.0016	24 09 12.53	-0.044
21	Tauri ..	5.8	03	41	47.553	+0.0012	24 20 25.67	-0.046
22	Tauri ..	6.5	03	41	55.979	+0.0006	24 18 50.37	-0.039
23	Tauri ..	4.3	03	42	13.607	+0.0016	+23 44 04.61	-0.050
104 B.	Tauri ..	5.5	03	44	15.453	+0.0008	23 12 38.05	-0.045
27	Tauri ..	3.7	03	45	03.312	+0.0013	23 50 37.50	-0.048
28	Tauri ..	5.2	03	45	04.624	+0.0009	23 55 38.13	-0.046
14 H.	Tauri ..	5.3	03	46	09.795	+0.0033	25 22 21.61	-0.103
33	Tauri ..	6.0	03	52	58.265	+0.0026	+22 58 35.97	-0.009
161 B.	Tauri ..	6.5	03	56	50.965	+0.0027	23 00 27.55	-0.052
36	Tauri ..	5.6	04	00	13.839	+0.0001	23 55 02.01	-0.022
p	Tauri ..	5.5	04	06	37.487	-0.0024	26 18 08.18	-0.042
χ	Tauri ..	5.3	04	18	22.851	+0.0028	25 28 04.17	-0.029
62	Tauri ..	6.1	04	19	49.978	+0.0008	+24 08 29.78	-0.019
17 B.	Aurigæ ..	6.0	04	48	28.343	+0.0033	27 47 00.79	-0.037
38 B.	Aurigæ ..	6.5	05	00	18.893	-0.0001	27 36 03.47	-0.075
47 B.	Aurigæ ..	6.0	05	05	24.799	..	27 56 43.54	..
354 B.	Tauri ..	6.4	05	16	39.191	-0.0027	27 53 20.28	-0.015
22	Aurigæ ..	6.4	05	19	00.580	+0.0017	+28 52 21.42	-0.031

MEAN PLACES OF OCCULTATION STARS, 1931. 525

MEAN PLACES FOR 1931.0. (January 1^d 322, Greenwich Mean Time.)

Name of Star.	Magni- tude.	Right Ascension.	Annual Proper Motion.	Declination.	Annual Proper Motion.
107 B. Aurigæ ..	6.5	^h 05 ^m 31 ^s 35.646	^s -0.0013	+27 37 06.69	["] -0.076
112 B. Aurigæ ..	5.7	05 32 50.144	-0.0004	26 52 57.31	-0.040
116 B. Aurigæ ..	5.9	05 34 55.022	+0.0012	29 10 37.50	-0.010
406 B. Tauri ..	5.6	05 46 37.110	-0.0013	27 56 56.14	+0.011
136 Tauri ..	4.6	05 48 59.457	+0.0013	27 35 51.00	-0.020
154 B. Aurigæ ..	6.4	05 52 10.770	..	+28 55 58.84	..
415 B. Tauri ..	6.1	05 56 40.412	+0.0018	27 34 13.32	-0.001
183 B. Aurigæ ..	6.3	06 01 58.126	..	29 31 10.55	..
κ Aurigæ ..	4.4	06 10 58.967	-0.0044	29 31 30.79	-0.262
211 B. Aurigæ ..	6.3	06 16 47.638	..	29 34 26.97	..
49 Aurigæ ..	5.1	06 30 51.385	-0.0001	+28 04 39.41	-0.027
53 Aurigæ ..	5.6	06 34 00.515	-0.0019	29 02 42.42	-0.021
54 Aurigæ ..	5.8	06 35 12.080	-0.0012	28 19 32.07	-0.025
28 Geminorum ..	5.5	06 40 23.233	-0.0001	29 02 32.56	-0.026
47 Geminorum ..	5.6	07 07 06.457	-0.0011	26 58 16.85	-0.051
53 Geminorum ..	5.9	07 11 38.759	-0.0008	+28 01 08.53	-0.002
134 B. Geminorum ..	6.5	07 12 47.135	+0.0057	26 48 55.09	-0.134
59 Geminorum ..	5.7	07 20 16.001	+0.0010	27 46 22.41	+0.019
ι Geminorum ..	3.8	07 21 26.650	-0.0086	27 56 12.44	-0.087
δ ¹ Geminorum ..	5.0	07 25 02.669	-0.0032	28 15 42.70	-0.062
δ ² Geminorum ..	5.0	07 25 31.434	-0.0019	+28 03 35.79	-0.030
υ Geminorum ..	4.3	07 31 40.452	-0.0016	27 03 02.08	-0.109
ε Geminorum ..	5.5	07 39 54.523	-0.0017	25 56 58.43	-0.028
φ Geminorum ..	4.9	07 49 16.690	-0.0020	26 56 45.45	-0.027
ω Cancrī ..	6.1	07 56 45.533	+0.0003	25 34 58.98	-0.004
4 Cancrī ..	6.2	07 57 34.292	-0.0012	+25 16 50.73	+0.007
ψ Cancrī ..	5.9	08 06 18.022	-0.0055	25 43 05.29	-0.351
λ Cancrī ..	5.9	08 16 26.214	-0.0011	24 14 27.03	-0.028
28 Cancrī ..	6.1	08 24 31.532	-0.0024	24 22 29.85	-0.071
υ ¹ Cancrī ..	5.7	08 27 25.967	-0.0056	24 18 53.33	-0.069
υ ² Cancrī ..	6.4	08 28 55.610	-0.0047	+24 19 13.95	-0.068
79 Cancrī ..	6.1	09 06 23.253	+0.0003	22 16 39.13	-0.005
90 H ¹ . Cancrī ..	6.1	09 09 41.057	-0.0007	21 34 06.52	-0.013
8 Leonis ..	5.9	09 33 14.382	-0.0006	16 44 52.16	-0.015
57 B. Leonis ..	6.5	09 40 40.084	+0.0020	19 10 53.11	-0.077
107 B. Leonis ..	6.3	10 01 56.621	-0.0023	+16 05 39.99	+0.017
η Leonis ..	3.6	10 03 34.298	-0.0022	17 05 59.53	-0.004
34 Leonis ..	6.4	10 07 55.811	+0.0037	13 41 47.44	-0.036
37 Leonis ..	5.5	10 12 58.685	-0.0013	14 04 23.22	-0.014
42 Leonis ..	6.1	10 18 07.875	-0.0017	15 19 26.25	-0.027
46 Leonis ..	5.8	10 28 30.956	-0.0024	+14 29 31.21	+0.022
308 B. Leonis ..	5.8	11 10 26.797	+0.0032	8 26 18.32	-0.125
σ Leonis ..	4.2	11 17 34.785	-0.0062	6 24 28.17	-0.013
80 Leonis ..	6.4	11 22 17.365	-0.0051	4 14 24.43	-0.050
89 Leonis ..	5.7	11 30 50.120	-0.0121	3 26 36.96	-0.104
27 B. Virginis ..	6.5	11 55 31.654	-0.0033	+ 0 54 52.12	+0.034

526 MEAN PLACES OF OCCULTATION STARS, 1931.

MEAN PLACES FOR 1931.0. (January 1^d.322, Greenwich Mean Time.)

Name of Star.		Magni- tude.	Right Ascension.			Annual Proper Motion.	Declination.	Annual Proper Motion.		
			^h 12	^m 06	^s 09.196	^s +0.0034	[°] + 2	['] 17	["] 07.24	["] -0.181
10	Virginis..	6.2	12	06	09.196	+0.0034	+ 2	17	07.24	-0.181
13	Virginis..	5.9	12	15	08.018	+0.0019	- 0	24	13.58	-0.021
162 B.	Virginis..	6.2	12	24	19.075	-0.0062	4	14	01.16	-0.003
200 B.	Virginis..	6.3	12	28	05.795	-0.0022	4	40	19.33	+0.035
<i>f</i>	Virginis..	6.0	12	33	14.015	-0.0021	5	27	06.67	-0.027
319 B.	Virginis..	6.3	12	43	59.335	-0.0003	- 5	55	27.97	-0.053
91 G.	Virginis..	6.5	12	50	04.381	-0.0025	3	50	56.87	-0.070
<i>g</i>	Virginis..	5.6	13	04	56.516	-0.0011	8	36	54.66	-0.074
<i>h</i>	Virginis..	5.4	13	29	19.838	-0.0025	9	48	35.99	-0.042
550 B.	Virginis..	6.0	13	31	00.140	-0.0040	12	51	39.63	-0.014
86	Virginis..	5.6	13	42	15.514	-0.0014	-12	04	52.18	+0.012
621 B.	Virginis..	6.4	14	00	42.620	-0.0030	14	38	26.35	-0.018
214 G.	Virginis..	6.5	14	01	27.985	-0.0036	16	00	22.84	-0.012
40 H.	Virginis..	5.1	14	07	04.158	+0.0003	15	58	36.62	-0.014
43 B.	Librae ..	5.7	14	53	25.950	+0.0747	21	06	21.99	-1.791
47 G.	Librae ..	6.1	15	02	28.089	+0.0066	-21	45	51.75	-0.050
25	Librae ..	6.0	15	09	23.109	-0.0036	19	23	19.17	-0.035
64 G.	Librae ..	5.8	15	12	22.738	-0.0028	22	08	42.04	+0.018
153 B.	Librae ..	6.3	15	29	03.766	-0.0006	24	15	22.62	-0.042
169 B.	Librae ..	6.0	15	33	44.409	-0.0017	22	54	49.39	-0.068
177 B.	Librae ..	6.2	15	35	17.621	-0.0016	-22	55	32.78	-0.034
42	Librae ..	5.0	15	36	11.858	-0.0018	23	35	42.52	-0.027
<i>b</i>	Scorpii ..	4.7	15	46	49.424	-0.0024	25	32	34.98	-0.044
<i>A</i>	Scorpii ..	4.6	15	49	27.881	-0.0017	25	07	20.28	-0.023
31 B.	Scorpii ..	5.4	15	49	46.281	-0.0022	24	19	44.33	-0.037
32 B.	Scorpii ..	5.3	15	49	49.169	-0.0023	-23	46	24.80	-0.016
3	Scorpii ..	5.9	15	50	30.613	-0.0031	25	02	25.68	-0.029
40 B.	Scorpii ..	5.4	15	54	26.253	-0.0031	24	38	00.14	+0.004
48 B.	Scorpii ..	4.9	15	59	10.201	-0.0048	25	40	27.49	-0.043
50 B.	Scorpii ..	6.4	15	59	45.945	+0.0017	24	32	15.36	-0.032
24 G.	Scorpii ..	6.2	16	03	43.225	0.0000	-24	16	44.90	-0.068
65 B.	Scorpii ..	5.5	16	03	55.136	+0.0095	26	08	33.68	+0.023
41 G.	Scorpii ..	6.3	16	09	36.312	-0.0004	24	14	49.58	-0.034
85 B.	Scorpii ..	6.0	16	10	42.329	-0.0005	25	18	10.41	+0.012
116 B.	Scorpii ..	6.2	16	27	08.591	-0.0013	26	23	20.01	-0.037
134 B.	Scorpii ..	6.4	16	40	00.466	+0.0012	-27	19	41.27	-0.014
95 G.	Ophiuchi ..	6.1	17	08	05.787	+0.0008	27	40	41.47	-0.029
43	Ophiuchi ..	5.4	17	19	00.897	-0.0002	28	04	39.73	-0.040
163 G.	Ophiuchi ..	6.3	17	38	56.988	+0.0002	27	51	08.89	-0.017
<i>X</i>	Sagittarii (<i>var.</i>)	4.4	17	43	12.991	+0.0002	27	48	22.18	-0.015
10 G.	Sagittarii ..	5.7	17	52	20.406	+0.0024	-28	03	18.98	+0.015
210 B.	Scorpii ..	5.8	17	54	16.513	+0.0028	28	45	09.94	+0.005
<i>W</i>	Sagittarii (<i>var.</i>)	4.3	18	00	36.738	+0.0007	29	35	05.37	-0.015
38 B.	Sagittarii ..	4.7	18	03	42.741	+0.0016	28	27	58.22	-0.020
C. D. -28° 14268..		6.4	18	07	34.977	-0.0002	-28	55	04.55	-0.019

MEAN PLACES OF OCCULTATION STARS, 1931. 527

MEAN PLACES FOR 1931.0. (January 1^d 322, Greenwich Mean Time.)

Name of Star.	Magni- tude.	Right Ascension.	Annual Proper Motion.	Declination.	Annual Proper Motion.
		^h ^m ^s	^s	[°] ['] ["]	["]
48 G. Sagittarii ..	6.3	18 13 01.364	+0.0093	-28 18 46.23	-0.234
62 B. Sagittarii ..	6.0	18 13 01.954	+0.0053	28 40 34.92	+0.032
58 G. Sagittarii ..	6.1	18 17 38.276	+0.0028	28 27 46.09	+0.005
183 B. Sagittarii ..	6.2	19 03 10.392	+0.0024	28 44 40.79	-0.009
234 B. Sagittarii ..	5.9	19 20 12.125	-0.0013	28 00 01.25	+0.017
248 B. Sagittarii ..	5.7	19 25 36.228	+0.0017	-27 07 40.16	-0.014
ω Sagittarii ..	4.8	19 51 36.905	+0.0145	26 29 02.06	+0.080
b Sagittarii ..	4.6	19 52 42.913	-0.0002	27 21 15.62	-0.016
A Sagittarii ..	4.9	19 54 45.062	+0.0013	26 23 01.17	+0.036
36 B. Capricorni ..	6.2	20 25 28.585	+0.0003	22 37 17.61	-0.027
40 B. Capricorni ..	6.2	20 28 46.062	+0.0003	-25 10 42.29	-0.064
56 B. Capricorni ..	6.3	20 36 05.645	+0.0375	24 01 38.09	+0.463
17 Capricorni ..	5.8	20 42 10.146	+0.0011	21 45 57.39	-0.014
η Capricorni ..	4.8	21 00 28.864	-0.0025	20 07 44.92	-0.047
χ Capricorni ..	5.3	21 04 36.683	+0.0013	21 28 18.90	-0.059
27 Capricorni ..	6.1	21 05 36.497	+0.0085	-20 50 04.13	-0.122
φ Capricorni ..	5.3	21 11 42.394	0.0000	20 56 20.78	0.000
33 Capricorni ..	5.3	21 20 14.959	-0.0013	21 08 45.38	-0.112
128 B. Capricorni ..	6.5	21 26 07.387	+0.0019	19 26 58.48	-0.027
37 Capricorni ..	5.7	21 30 58.820	-0.0016	20 23 34.50	+0.025
ε Capricorni ..	4.7	21 33 13.168	0.0000	-19 46 34.15	0.000
γ Capricorni ..	3.7	21 36 16.241	+0.0129	16 58 29.19	-0.017
κ Capricorni ..	4.8	21 38 48.457	+0.0094	19 10 53.98	-0.006
152 B. Capricorni ..	6.5	21 46 25.335	-0.0004	17 10 05.19	-0.054
29 Aquarii (mean) ..	6.5	21 58 40.088	+0.0008	17 17 51.67	+0.009
ι Aquarii ..	4.4	22 02 42.744	+0.0022	-14 12 18.81	-0.062
39 Aquarii ..	6.2	22 08 42.639	+0.0016	14 32 03.62	-0.044
42 Aquarii ..	5.5	22 13 06.551	+0.0010	13 10 34.29	+0.009
45 Aquarii ..	6.1	22 15 18.687	+0.0051	13 39 03.67	-0.001
50 Aquarii ..	5.9	22 20 45.445	+0.0034	13 52 47.07	+0.013
182 B. Aquarii ..	6.2	22 26 20.349	+0.0129	-13 16 09.29	-0.019
58 Aquarii ..	6.4	22 28 01.957	+0.0050	11 15 34.53	-0.031
70 Aquarii ..	6.1	22 44 52.550	+0.0035	10 55 12.95	+0.010
74 Aquarii ..	5.8	22 49 50.838	+0.0013	11 59 02.11	0.000
81 Aquarii ..	6.4	22 57 48.534	-0.0015	7 25 55.17	-0.001
h Aquarii ..	5.4	23 01 33.949	+0.0081	- 8 03 59.23	+0.016
φ Aquarii ..	4.6	23 10 44.945	+0.0015	6 25 16.71	-0.194
χ Aquarii ..	5.3	23 13 16.396	-0.0015	8 06 11.21	-0.014
96 Aquarii ..	5.7	23 15 49.320	+0.0128	5 30 05.48	-0.009
317 B. Aquarii ..	6.3	23 17 07.466	-0.0099	6 17 06.37	-0.065
337 B. Aquarii ..	6.4	23 25 58.077	+0.0121	- 4 54 30.92	-0.218
342 B. Aquarii ..	6.5	23 27 57.727	+0.0124	4 27 51.91	-0.172
20 Piscium ..	5.6	23 44 23.738	+0.0064	3 08 43.30	+0.002
24 Piscium ..	6.1	23 49 22.916	+0.0051	3 32 19.62	-0.048
60 B. Piscium ..	6.0	23 51 14.715	-0.0023	- 0 16 28.23	-0.013

THE STAR'S					AT CONJUNCTION IN R.A.					Limiting Parallels.	
Name.	Mag.	Reductions from 1931 ^o .		Apparent Declina- tion.	Greenwich Mean Time.	Hour Angle, H	Y	x'	y'	N.	S.
		Δα	Δδ								
66 Arietis	6.1	+0.48	+9.5	+22 34.2	1 01 09.6	+4 24.2	-1.0579	0.5480	+0.1851	-17	-68
17 Tauri	3.8	0.57	9.9	23 54.0	08 20.4	+11 19.7	-1.1646	0.5557	0.1711	-28	-67
23 Tauri	4.3	0.57	9.9	23 44.2	08 58.1	+11 56.1	-0.8872	0.5563	0.1697	-6	-67
7 Tauri	2.9	0.58	9.9	23 53.7	09 27.9	-11 35.2	-0.9680	0.5569	0.1687	-11	-67
104 B. Tauri	5.5	0.58	9.8	23 12.8	09 50.6	-11 13.4	-0.1928	0.5573	0.1679	+34	-40
27 Tauri	3.7	+0.59	+9.9	+23 50.8	10 11.2	-10 53.5	-0.7950	0.5576	+0.1672	0	-67
28 Tauri	5.2	0.59	9.9	23 55.8	10 11.7	-10 53.0	-0.8805	0.5576	0.1672	-5	-67
33 Tauri	6.0	0.63	9.7	22 58.8	13 34.0	-7 38.1	+0.6606	0.5612	0.1599	+90	+4
161 B. Tauri	6.5	0.65	9.7	23 00.6	15 12.4	-6 03.3	+0.8870	0.5630	0.1563	+90	+17
36 Tauri	5.6	0.66	9.9	23 55.2	16 37.8	-4 41.0	+0.1623	0.5644	0.1530	+54	-20
x Tauri	5.3	+0.76	+10.1	+25 28.2	2 00 08.6	+2 32.9	-0.3593	0.5722	+0.1350	+25	-45
62 Tauri	6.1	0.76	9.9	24 08.7	00 44.2	+3 07.2	+1.0897	0.5728	0.1335	+90	+35
38 B. Aurigæ	6.5	0.95	10.0	27 36.2	16 48.9	-5 25.9	-0.6657	0.5877	0.0894	+7	-60
47 B. Aurigæ	6.0	0.97	9.9	27 56.9	18 47.2	-3 32.4	-0.8463	0.5893	0.0835	-5	-63
354 B. Tauri	6.4	1.01	9.6	27 53.5	23 05.8	+0 35.7	-0.4550	0.5927	0.0704	+19	-46
β Tauri	1.7	+1.04	+9.6	+28 33.2	8 01 06.3	+2 31.2	-0.9930	0.5941	+0.0642	-16	-62
107 B. Aurigæ	6.5	1.06	9.2	27 37.3	04 45.6	+6 01.4	+0.1693	0.5965	0.0526	+55	-10
112 B. Aurigæ	5.7	1.06	9.1	26 53.1	05 13.6	+6 28.2	+0.9409	0.5968	0.0511	+90	+32
406 B. Tauri	5.6	1.12	8.8	27 57.1	10 23.2	+11 24.9	+0.0790	0.5998	0.0344	+49	-13
136 Tauri	4.6	1.12	8.8	27 36.0	11 16.2	-11 44.3	+0.4638	0.6002	0.0315	+76	+7
154 B. Aurigæ	6.4	+1.14	+8.8	+28 56.1	12 27.4	-10 36.2	-0.8527	0.6008	+0.0275	-6	-62
415 B. Tauri	6.1	1.14	8.5	27 34.4	14 07.4	-9 00.4	+0.5668	0.6015	+0.0220	+85	+13
49 Aurigæ	5.1	1.22	7.4	28 04.8	4 02 42.0	+3 02.1	+0.0633	0.6052	-0.0206	+49	-13
53 Aurigæ	5.6	1.24	7.3	29 02.8	03 51.2	+4 08.4	-0.9347	0.6053	0.0246	-12	-61
54 Aurigæ	5.8	1.24	7.2	28 19.7	04 17.4	+4 33.5	-0.2228	0.6054	0.0261	+32	-28
28 Geminorum	5.5	+1.26	+7.0	+29 02.7	06 11.2	+6 22.4	-0.9976	0.6056	-0.0326	-16	-61
47 Geminorum	5.6	1.26	5.9	26 58.4	15 57.6	-8 16.3	+0.5972	0.6051	0.0658	+89	+11
53 Geminorum	5.9	1.28	5.7	28 01.2	17 37.4	-6 40.8	-0.5643	0.6048	0.0714	+13	-52
134 B. Geminorum	6.5	1.26	5.7	26 49.0	18 02.4	-6 16.8	+0.6086	0.6047	0.0728	+90	+11
59 Geminorum	5.7	1.28	5.3	27 46.5	20 47.2	-3 39.1	+0.5602	0.6040	0.0819	+13	-53
i Geminorum	3.8	+1.29	+5.2	+27 56.3	21 13.2	-3 14.2	-0.7595	0.6039	-0.0833	+1	-63
b ² Geminorum	5.0	1.29	5.1	28 03.7	22 43.2	-1 48.0	-1.0109	0.6035	0.0883	-17	-62
v Geminorum	4.3	1.28	4.8	27 03.1	5 00 59.3	+0 22.3	-0.2120	0.6027	0.0957	+33	-33
c Geminorum	5.5	1.26	4.5	25 57.0	04 02.0	+3 17.3	+0.5792	0.6016	0.1055	+86	+6
φ Geminorum	4.9	1.28	4.0	26 56.8	07 30.8	+6 37.2	-0.7995	0.5999	0.1165	-1	-64
ω Cancræ	6.1	+1.25	+3.7	+25 35.0	10 18.3	+9 17.7	+0.2199	0.5986	-0.1252	+58	-14
4 Cancræ	6.2	1.25	3.7	25 16.9	10 36.6	+9 35.2	+0.4825	0.5984	0.1261	+77	-1
ψ Cancræ	5.9	1.25	3.2	25 43.1	13 53.2	-11 16.3	-0.3820	0.5965	0.1360	+24	-47
λ Cancræ	5.9	1.22	2.9	24 14.5	17 43.2	-7 35.9	+0.5436	0.5942	0.1473	+82	0
28 Cancræ	6.1	1.21	2.5	24 22.5	20 48.0	-4 38.6	-0.0568	0.5922	0.1560	+42	-31
ν ¹ Cancræ	5.7	+1.21	+2.3	+24 18.9	21 54.7	-3 34.7	-0.1724	0.5914	-0.1591	+35	-37
ν ² Cancræ	6.4	1.21	2.3	24 19.3	22 29.1	-3 01.6	-0.2697	0.5910	0.1607	+30	-42
ξ Cancræ	5.2	1.12	0.7	22 19.6	6 12 43.6	+10 38.7	-0.8433	0.5800	0.1970	-2	-68
79 Cancræ	6.1	1.11	0.7	22 16.7	13 07.3	+11 01.4	-0.8735	0.5797	0.1979	-4	-68
90 H ¹ Cancræ	6.1	1.09	0.6	21 34.1	14 26.2	-11 42.7	-0.4323	0.5786	0.2009	+21	-55
MARS	-0.8	..	..	+20 21.7	15 26.8	-10 44.5	+0.5637	0.5894	-0.2085	+82	-5
57 B. Leonis	6.5	+0.97	-0.5	19 10.9	7 03 03.0	+0 25.2	-0.7673	0.5680	0.2270	+3	-71
107 B. Leonis	6.3	0.87	0.8	16 05.7	11 59.0	+9 01.4	+0.2004	0.5605	0.2422	+56	-27
η Leonis	3.6	0.87	1.1	17 06.0	12 40.6	+9 41.5	-0.9670	0.5599	0.2433	-9	-73
37 Leonis	5.5	0.80	0.8	14 04.4	16 42.5	-10 25.4	+1.0486	0.5567	0.2493	+90	+18
42 Leonis	6.1	+0.80	-1.4	+15 19.4	18 56.2	-8 16.4	-0.7544	0.5549	-0.2524	+5	-75
46 Leonis	5.8	+0.75	-1.7	+14 29.5	23 28.2	-3 54.0	-1.0842	0.5514	-0.2581	-16	-76

Full Moon—Jan. 4^h 13^m 14^s.9

JANUARY.

THE STAR'S					AT CONJUNCTION IN R.A.					Limiting Parallels.	
Name.	Mag.	Reductions from 1931.0.		Apparent Declina- tion.	Greenwich Mean Time.	Hour Angle, H	Y	x'	y'	N.	S.
		$\Delta\alpha$	$\Delta\delta$								
1 Leonis	5.2	+0.04	-1.5	+10 54.6	8 07 03.6	+3 25.5	+0.4928	0.5460	-0.2663	+75	-16
308 B Leonis	5.8	0.30	1.8	8 26.3	18 19.0	-9 42.2	-0.0897	0.5388	0.2754	+40	-47
σ Leonis	4.2	0.45	1.5	6 24.4	21 36.2	-6 31.6	+1.0348	0.5369	0.2774	+90	+13
10 Virginis	6.2	0.17	2.2	+2 17.1	9 20 29.7	-8 22.8	-1.2629	0.5274	0.2832	-28	-88
13 Virginis	5.9	0.10	1.6	-0 24.3	10 00 48.1	-4 12.7	+0.2352	0.5263	0.2828	+57	-33
η Virginis	4.0	+0.10	-1.7	-0 17.0	01 23.9	-3 38.0	-0.0553	0.5262	-0.2827	+41	-48
91 G. Virginis	6.5	-0.12	1.8	3 51.0	17 40.2	-11 52.8	-1.0026	0.5242	0.2772	-9	-90
h Virginis	5.4	0.38	1.3	9 48.6	11 12 38.3	+6 29.3	-0.0498	0.5258	0.2634	+40	-47
86 Virginis	5.6	0.46	1.0	12 04.9	18 50.7	-11 30.3	+0.6710	0.5271	0.2572	+77	-10
621 B. Virginis	6.4	0.59	0.8	14 38.5	12 03 38.5	-2 59.5	+1.0964	0.5296	0.2471	+76	+17
25 Libræ	6.0	-0.97	-2.2	-19 23.4	18 11 30.5	+3 49.0	-1.0901	0.5427	-0.1969	-27	-90
169 B. Libræ	6.0	1.12	2.2	22 54.9	22 25.8	-9 38.1	+0.5800	0.5479	0.1750	+62	-13
177 B. Libræ	6.2	1.12	2.3	22 55.6	23 07.3	-8 58.2	+0.4726	0.5482	0.1735	+57	-19
42 Libræ	5.0	1.14	2.1	23 35.7	23 31.3	-8 35.0	+1.1086	0.5484	0.1727	+07	+22
31 B. Scorpïi	5.4	1.20	2.6	24 19.8	14 05 30.9	-2 48.0	+0.8894	0.5512	0.1596	+66	+6
32 B. Scorpïi	5.3	-1.19	-2.7	-23 46.5	05 32.2	-2 46.7	+0.2993	0.5512	-0.1595	+45	-28
40 B. Scorpïi	5.4	1.22	2.7	24 38.0	07 33.7	-0 49.5	+0.8899	0.5521	0.1550	+66	+6
50 B. Scorpïi	6.4	1.24	3.0	24 32.3	09 53.5	+1 25.4	+0.4344	0.5531	0.1496	+51	-21
24 G. Scorpïi	6.2	1.25	3.2	24 16.8	11 36.9	+3 05.1	-0.0934	0.5539	0.1456	+24	-50
41 G. Scorpïi	6.3	1.27	3.5	24 14.9	14 10.4	+5 33.1	-0.4923	0.5550	0.1396	+2	-77
85 B. Scorpïi	6.0	-1.29	-3.3	-25 18.2	14 39.0	+6 00.7	+0.5606	0.5552	-0.1385	+58	-14
σ Scorpïi	3.0	1.31	3.5	25 25.8	17 22.1	+8 38.0	+0.3271	0.5562	0.1319	+43	-27
α Sco. (Antares)	1.3	1.35	3.7	26 16.9	20 53.6	-11 58.2	+0.7826	0.5576	0.1232	+64	0
116 B. Scorpïi	6.2	1.36	3.8	26 23.4	21 44.4	-11 09.1	+0.7947	0.5579	0.1211	+64	+1
95 G. Ophiuchi	6.1	1.48	5.4	27 40.8	15 15 10.0	+5 38.3	+0.4534	0.5630	0.0758	+46	-19
43 Ophiuchi	5.4	-1.51	-5.8	-28 04.8	19 46.4	+10 04.5	+0.5619	0.5638	-0.0633	+52	-13
163 G. Ophiuchi	6.3	1.54	6.7	27 51.3	16 04 09.6	-5 50.6	-0.1135	0.5646	0.0403	+12	-52
X Sagitt. (var.)	4.4	1.55	6.9	27 48.5	05 57.3	-4 07.0	-0.2311	0.5646	0.0353	+6	-59
10 G. Sagittarii	5.7	1.56	7.3	28 03.4	09 47.4	-0 25.3	-0.0780	0.5646	0.0247	+13	-49
210 B. Scorpïi	5.8	1.57	7.2	28 45.3	10 36.3	+0 21.7	+0.6542	0.5646	0.0224	+56	-7
38 B. Sagittarii	4.7	-1.58	-7.7	-28 28.1	14 34.6	+4 11.2	+0.2790	0.5643	-0.0114	+30	-29
C. D.—28° 14268	6.4	1.59	7.8	28 55.2	16 12.4	+5 45.4	+0.7520	0.5641	0.0068	+62	-1
48 G. Sagittarii	6.3	1.58	8.1	28 18.9	18 30.1	+7 58.0	+0.0906	0.5639	0.0005	+19	-40
62 B. Sagittarii	6.0	1.59	8.0	28 40.7	18 30.3	+7 58.2	+0.4833	0.5639	-0.0005	+42	-17
152 B. Capricorni	6.5	1.18	11.8	17 10.3	20 20 30.0	+6 40.6	-0.6659	0.5088	+0.2092	+2	-90
29 Aquarii	6.5	-1.14	-11.8	-17 18.1	21 02 53.6	-11 06.9	+0.8400	0.5048	+0.2169	+73	+1
39 Aquarii	6.2	1.11	11.2	14 32.2	08 12.6	-5 57.2	-1.0538	0.5015	0.2228	-19	-90
45 Aquarii	6.1	1.09	11.0	13 39.2	11 44.4	-2 31.4	-1.2410	0.4996	0.2265	-34	-90
50 Aquarii	5.9	1.07	10.9	13 53.0	14 40.3	+0 19.6	-0.3191	0.4979	0.2293	+24	-63
182 B. Aquarii	6.2	1.05	10.7	13 16.3	17 41.7	+3 15.9	-0.2989	0.4963	0.2322	+25	-62
70 Aquarii	6.1	-0.99	-9.9	-10 55.4	22 03 52.0	-10 50.8	-0.5018	0.4915	+0.2405	+16	-75
74 Aquarii	5.8	0.96	10.0	11 59.2	06 37.6	-8 09.6	+1.3457	0.4902	0.2424	+76	+40
X Aquarii	5.3	0.88	8.5	8 06.3	19 47.0	+4 38.4	+0.2802	0.4856	0.2503	+58	-30
317 B. Aquarii	6.3	0.88	8.0	6 17.2	21 58.0	+6 46.0	-1.1909	0.4849	0.2514	-24	-90
20 Piscium	5.6	0.78	6.3	3 08.8	28 13 33.2	-2 03.5	-0.7092	0.4818	0.2570	+8	-90
24 Piscium	6.1	-0.76	-6.2	-3 32.4	16 25.2	+0 44.0	+0.4645	0.4814	+0.2576	+71	-21
80 B. Piscium	6.3	0.73	5.0	-0 53.2	23 24.4	+7 32.2	-0.6713	0.4810	0.2588	+10	-89
98 B. Piscium	6.3	0.69	3.9	+1 18.2	24 06 43.6	-9 20.1	-1.2001	0.4812	0.2593	-23	-89
44 Piscium	6.1	0.65	3.5	1 33.4	11 06.1	-5 04.6	-0.3444	0.4815	0.2592	+27	-63
147 B. Piscium	5.9	0.56	1.7	4 55.6	25 00 10.7	+7 39.2	-0.6808	0.4838	0.2575	+10	-84
URANUS	6.2	..	..	+4 07.6	00 18.4	+7 46.8	+0.2330	0.4827	+0.2570	+57	-32
171 B. Piscium	6.3	-0.52	-0.8	+6 06.7	06 40.6	-10 01.2	-0.3169	0.4857	+0.2557	+29	-61

Last Quarter—Jan. 11^d 05^h 09^m.2New Moon—Jan. 18^d 18^m 35^s.6

THE STAR'S					AT CONJUNCTION IN R.A.					Limiting Parallels.	
Name.	Mag.	Reductions from 1931.0.		Apparent Declina- tion.	Greenwich Mean Time.	Hour Angle, H	Y	z'	y'	N.	S.
		λ	$\Delta\delta$								
73 Piscium	6.2	-0.48	-0.9	+5 17.2	25 09 31.0	-7 15.4	+1.3140	0.4866	+0.2548	+90	+34
8 Piscium	5.3	0.45	+0.1	7 12.7	14 26.8	-2 27.5	+0.4514	0.4885	0.2528	+71	-20
6 Piscium	6.2	0.44	0.0	6 37.8	14 59.9	-1 55.4	+1.2272	0.4887	0.2526	+90	+27
26 B. Arietis	6.0	0.25	+3.4	11 57.7	26 15 11.1	-2 24.8	+1.3381	0.5020	0.2373	+82	+43
12 H ¹ Arietis	6.3	0.24	3.9	13 08.7	16 49.9	-0 48.9	+0.4418	0.5031	0.2359	+71	-18
19 Arietis	5.8	-0.19	+4.9	+14 57.6	22 15.1	+4 26.9	-0.2575	0.5071	+0.2309	+31	-52
27 Arietis	6.4	0.10	6.3	17 24.1	27 07 18.4	-10 46.3	-0.8441	0.5143	0.2213	-1	-73
36 Arietis	6.5	-0.02	6.7	17 28.5	13 57.1	-4 19.9	+0.5215	0.5200	0.2131	+78	-10
40 Arietis	6.0	0.00	7.0	18 00.0	16 00.3	-2 20.6	+0.3927	0.5218	0.2104	+68	-16
π Arietis	5.2	+0.01	6.7	17 10.8	16 23.0	-1 58.5	+1.3500	0.5222	0.2099	+74	+52
45 Arietis	6.0	+0.04	+7.2	+18 03.3	19 31.4	+1 03.9	+1.0633	0.5250	+0.2055	+90	+23
47 Arietis	5.8	0.05	8.0	20 23.7	20 35.0	+2 05.5	-1.2220	0.5261	0.2040	-31	-70
δ Arietis	4.5	0.14	8.0	19 28.2	28 03 00.4	+8 18.4	+1.0457	0.5322	0.1942	+90	+23
ζ Arietis	4.8	0.15	8.5	20 47.5	04 31.6	+9 46.6	-0.0696	0.5338	0.1917	+41	-37
τ Arietis	5.1	0.19	8.6	20 54.1	07 27.0	-11 23.8	+0.3670	0.5367	0.1868	+67	-14
63 Arietis	5.2	+0.20	+8.5	+20 29.9	08 09.6	-10 42.7	+0.9263	0.5374	+0.1855	+90	+16
65 Arietis	6.0	0.21	8.6	20 33.7	08 55.7	-9 58.1	+1.0009	0.5382	0.1842	+90	+21
66 Arietis	6.1	0.23	9.3	22 34.2	10 44.1	-8 13.3	-0.7980	0.5400	0.1810	+1	-68
16 Tauri	5.4	0.33	10.0	24 04.6	18 03.2	-1 09.3	-1.1109	0.5475	0.1671	-22	-66
17 Tauri	3.8	0.33	10.0	23 54.0	18 05.2	-1 07.3	-0.9196	0.5476	0.1671	-8	-67
20 Tauri	4.1	+0.34	+10.1	+24 09.4	18 30.3	-0 43.2	-1.1195	0.5480	+0.1662	-23	-66
23 Tauri	4.3	0.34	9.9	23 44.2	18 43.8	-0 30.0	-0.6403	0.5482	0.1658	+10	-64
η Tauri	2.9	0.35	10.0	23 53.8	19 14.4	-0 00.6	-0.7230	0.5487	0.1648	+5	-67
104 B. Tauri	5.5	0.36	9.8	23 12.8	19 37.6	+0 21.7	+0.0599	0.5492	0.1640	+48	-27
27 Tauri	3.7	0.36	10.0	23 50.8	19 58.7	+0 42.1	+0.5496	0.5495	0.1632	+15	-60
28 Tauri	5.2	+0.36	+10.0	+23 55.8	19 59.3	+0 42.7	-0.6360	0.5495	+0.1632	+10	-64
33 Tauri	6.0	0.42	9.8	22 58.8	23 26.4	+4 02.5	+0.9148	0.5531	0.1560	+90	+19
161 B. Tauri	6.5	0.44	9.8	23 00.6	29 01 07.1	+5 39.5	+1.1401	0.5549	0.1524	+90	+36
36 Tauri	5.6	0.46	10.1	23 55.2	02 34.5	+7 03.8	+0.4046	0.5564	0.1492	+70	-8
χ Tauri	5.3	0.58	10.6	25 28.2	10 15.6	-9 32.0	-0.1387	0.5643	0.1314	+37	-33
17 B. Aurigæ	6.0	+0.78	+11.1	+27 47.2	22 33.9	+2 18.2	-1.1145	0.5764	+0.0995	-26	-63
38 B. Aurigæ	6.5	0.85	10.9	27 36.2	30 03 16.6	+6 49.9	-0.4855	0.5806	0.0863	+17	-48
47 B. Aurigæ	6.0	0.88	11.0	27 56.9	05 17.0	+8 45.6	-0.6721	0.5824	0.0805	+6	-60
354 B. Tauri	6.4	0.95	10.7	27 53.5	09 40.2	-11 01.8	-0.2880	0.5861	0.0675	+28	-36
β Tauri	1.7	0.99	10.8	28 33.2	11 42.7	-9 04.2	-0.8345	0.5877	0.0613	-4	-62
107 B. Aurigæ	6.5	+1.04	+10.3	+27 37.3	15 25.4	-5 30.6	+0.3268	0.5904	+0.0498	+65	-2
112 B. Aurigæ	5.7	1.04	10.1	26 53.1	15 53.9	-5 03.3	+1.1020	0.5907	0.0483	+90	+43
116 B. Aurigæ	5.9	1.07	10.6	29 10.8	16 41.6	-4 17.5	-1.2046	0.5913	0.0459	-38	-61
406 B. Tauri	5.6	1.12	10.0	27 57.1	21 07.9	-0 02.1	+0.2217	0.5942	0.0317	+58	-6
136 Tauri	4.6	1.13	9.9	27 36.0	22 01.6	+0 49.3	+0.6063	0.5948	0.0288	+90	+14
154 B. Aurigæ	6.4	+1.16	+10.1	+28 56.1	23 13.7	+1 58.4	-0.7199	0.5955	+0.0249	+3	-61
415 B. Tauri	6.1	1.18	9.6	27 34.4	31 00 54.9	+3 35.5	+0.7024	0.5964	+0.0194	+90	+20
49 Aurigæ	5.1	1.35	8.6	28 04.8	13 36.9	-8 14.8	+0.1639	0.6017	-0.0231	+55	-8
53 Aurigæ	5.6	1.38	8.6	29 02.9	14 46.6	-7 08.0	-0.8394	0.6021	0.0270	-5	-61
54 Aurigæ	5.8	1.37	8.4	28 19.7	15 12.9	-6 42.8	-0.1270	0.6022	0.0285	+37	-24
28 Geminorum	5.5	+1.40	+8.4	+29 02.7	17 07.4	-4 53.2	-0.9081	0.6026	-0.0350	-10	-61

FEBRUARY.

47 Geminorum	5.6	+1.48	+6.8	+26 58.4	1 02 56.0	+4 30.3	+0.6622	0.6035	-0.0683	+90	+14
53 Geminorum	5.9	1.52	6.7	28 01.3	04 35.9	+6 05.9	-0.5032	0.6036	0.0739	+16	-49
134 B. Geminorum	6.5	1.50	6.5	26 49.0	05 01.0	+6 29.9	+0.6678	0.6036	0.0753	+90	+14
59 Geminorum	5.7	+1.54	+6.3	+27 46.5	07 45.8	+9 07.7	-0.5073	0.6033	-0.0845	+16	-50

First Quarter—Jan. 27^d 00^h 05^m.5

ELEMENTS OF OCCULTATIONS, 1931.

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FEBRUARY.

THE STAR'S					AT CONJUNCTION IN R.A.					Limiting Parallels.	
Name.	Mag.	Reductions from 1931.0.		Apparent Declina- tion.	Greenwich Mean Time.	Hour Angle, H	Y	x'	y'	N.	S.
		$\Delta\alpha$	$\Delta\delta$								
ⁱ Geminorum	3.8	+1.55	+6.2	+27 56.3	d h m 1 08 11.7	+ 9 32.4	-0.7074	0.6032	-0.0860	+ 4	-60
^b ¹ Geminorum	5.0	1.56	6.1	28 15.8	09 31.1	+10 48.5	-1.1474	0.6030	0.0904	-29	-62
^b ² Geminorum	5.0	1.56	6.0	28 03.7	09 41.7	+10 58.6	-0.9622	0.6030	0.0910	-13	-62
^v Geminorum	4.3	1.56	5.6	27 03.1	11 57.5	-10 51.3	-0.1708	0.6026	0.0984	+35	-31
^c Geminorum	5.5	1.57	5.0	25 57.1	14 59.6	- 7 56.9	+0.6097	0.6019	0.1084	+89	+ 8
ϕ Geminorum	4.9	+1.61	+ 4.6	+26 56.8	18 27.5	- 4 37.9	-0.7740	0.6009	-0.1195	0	-64
ω Cancri	6.1	1.60	4.1	25 35.0	21 14.0	- 1 58.4	+0.2338	0.5999	0.1283	+59	-14
4 Cancri	6.2	1.60	4.0	25 16.9	21 32.1	- 1 41.1	+0.4943	0.5998	0.1292	+78	0
ψ Cancri	5.9	1.63	3.5	25 43.1	20 47.3	+ 1 26.0	-0.3754	0.5985	0.1393	+24	-46
λ Cancri	5.9	1.62	2.8	24 14.5	04 35.1	+ 5 04.3	+0.5342	0.5966	0.1507	+81	0
28 Cancri	6.1	+1.63	+ 2.4	+24 22.5	07 38.0	+ 7 59.6	-0.0714	0.5951	-0.1597	+41	-32
^v ¹ Cancri	5.7	1.64	2.2	24 18.9	08 43.9	+ 9 02.7	-0.1892	0.5945	0.1628	+34	-38
^v ² Cancri	6.4	1.64	+ 2.1	24 19.3	09 17.9	+ 9 35.3	-0.2874	0.5942	0.1645	+29	-43
MARS	-1.0	..	..	23 28.3	10 44.4	+10 58.3	+0.3118	0.6108	0.1729	+63	-13
ξ Cancri	5.2	1.63	- 0.1	22 19.5	23 19.4	- 0 57.3	-0.8955	0.5852	0.2016	- 5	-68
79 Cancri	6.1	+1.63	- 0.2	+22 16.6	23 42.6	- 0 35.0	-0.9265	0.5850	-0.2026	- 8	-68
90 H ¹ Cancri	6.1	1.62	0.4	21 34.1	3 01 00.1	+ 0 39.4	-0.4934	0.5841	0.2057	+18	-59
57 B. Leonis	6.5	1.56	2.2	19 10.8	13 20.6	-11 29.0	-0.8594	0.5750	0.2325	- 2	-71
107 B. Leonis	6.3	1.49	3.2	16 05.6	22 03.1	- 3 06.5	+0.0709	0.5684	0.2484	+49	-35
η Leonis	3.6	1.50	3.4	17 05.9	22 43.6	- 2 27.5	-1.0824	0.5679	0.2495	-16	-73
37 Leonis	5.5	+1.44	- 3.6	+14 04.3	4 02 38.8	+ 1 19.0	+0.8937	0.5650	-0.2556	+90	+ 8
42 Leonis	6.1	1.45	4.1	15 19.4	04 48.7	+ 3 24.1	-0.8892	0.5634	0.2588	- 3	-75
46 Leonis	5.8	1.42	4.5	14 29.4	09 12.6	+ 7 38.4	-1.2257	0.5603	0.2648	-27	-76
^l Leonis	5.2	1.33	5.0	10 54.6	16 33.8	- 9 16.3	+0.3071	0.5552	0.2734	+62	-26
308 B. Leonis	5.8	1.24	5.9	8 26.2	5 03 27.0	+ 1 13.8	-0.2933	0.5486	0.2827	+30	-58
σ Leonis	4.2	+1.19	- 5.9	+ 6 24.4	06 37.5	+ 4 17.7	+0.8044	0.5468	-0.2847	+90	- 3
β Virginis	3.8	1.05	6.3	2 09.1	19 57.6	- 6 49.5	+1.1702	0.5405	0.2897	+90	+21
27 B. Virginis	6.5	1.00	6.4	+ 0 54.8	23 49.1	- 3 05.8	+1.2799	0.5390	0.2901	+90	+31
13 Virginis	5.9	0.92	6.9	- 0 24.3	6 08 51.8	+ 5 38.9	-0.0331	0.5362	0.2896	+42	-47
η Virginis	4.0	0.91	7.0	0 17.1	09 26.3	+ 6 12.1	-0.3194	0.5361	0.2895	+28	-63
91 G. Virginis	6.5	+0.74	- 7.3	- 3 51.1	7 01 08.7	- 2 36.5	-1.2714	0.5334	-0.2830	-30	-90
^h Virginis	5.4	0.52	6.8	9 48.7	19 30.7	- 8 50.8	-0.3471	0.5336	0.2678	+25	-64
86 Virginis	5.6	0.44	6.4	12 05.0	8 01 32.3	- 3 01.2	+0.3621	0.5343	0.2611	+61	-26
621 B. Virginis	6.4	+0.34	6.1	14 38.5	10 06.0	+ 5 15.5	+0.7826	0.5360	0.2501	+76	- 3
64 G. Libræ	5.8	-0.05	5.4	22 08.8	9 18 39.5	-11 17.3	+1.2417	0.5460	0.1945	+68	+34
169 B. Libræ	6.0	-0.16	5.8	-22 54.9	10 04 06.6	- 2 10.0	+0.3032	0.5494	-0.1746	+47	-28
177 B. Libræ	6.2	0.16	5.8	22 55.6	04 47.6	- 1 30.5	+0.1973	0.5496	0.1730	+40	-34
42 Libræ	5.0	0.18	5.6	23 35.8	05 11.4	- 1 07.5	+0.8300	0.5498	0.1722	+67	+ 2
31 B. Scorpïi	5.4	0.24	5.6	24 19.8	11 07.7	+ 4 36.1	+0.6198	0.5519	0.1587	+63	-11
32 B. Scorpïi	5.3	0.24	5.8	23 46.5	11 08.9	+ 4 37.3	+0.0327	0.5519	0.1587	+31	-43
40 B. Scorpïi	5.4	-0.26	- 5.7	-24 38.1	13 09.6	+ 6 33.8	+0.6230	0.5526	-0.1540	+63	-10
50 B. Scorpïi	6.4	0.29	5.8	24 32.4	15 28.4	+ 8 47.5	+0.1728	0.5534	0.1485	+37	-35
24 G. Scorpïi	6.2	0.30	6.0	24 16.8	17 11.2	+10 26.7	-0.3507	0.5539	0.1444	+11	-66
41 G. Scorpïi	6.3	0.33	6.2	24 14.9	19 43.7	-11 06.3	-0.7448	0.5547	0.1383	-11	-90
85 B. Scorpïi	6.0	0.34	5.9	25 18.3	20 12.2	-10 38.8	+0.3050	0.5549	0.1371	+43	-28
σ Scorpïi	3.0	-0.37	- 6.0	-25 25.8	22 54.6	- 8 02.2	+0.0761	0.5557	-0.1305	+30	-41
α Sco. (Antares)	1.3	0.41	5.9	26 16.9	11 02 25.4	- 4 39.0	+0.5355	0.5567	0.1217	+55	-15
116 B. Scorpïi	6.2	0.42	5.9	26 23.4	03 16.0	- 3 50.1	+0.5489	0.5570	0.1196	+55	-14
134 B. Scorpïi	6.4	0.48	5.9	27 19.8	08 45.8	+ 1 27.6	+0.9298	0.5583	0.1055	+63	+10
95 G. Ophiuchi	6.1	0.59	6.5	27 40.8	20 41.5	-11 02.8	+0.2360	0.5604	0.0738	+34	-31
43 Ophiuchi	5.4	-0.63	- 6.6	-28 04.8	12 01 18.6	- 6 35.9	+0.3523	0.5609	-0.0613	+39	-25
163 G. Ophiuchi	6.3	-0.70	- 7.1	-27 51.3	09 44.1	+ 1 31.1	-0.3092	0.5612	-0.0383	+ 2	-64

Full Moon—Feb. 3^d 00^h 25^m.9Last Quarter—Feb. 9^d 16^h 09^m.6

THE STAR'S					AT CONJUNCTION IN R.A.					Limiting Parallels.	
Name.	Mag.	Reductions from 1931.0.		Apparent Declina- tion.	Greenwich Mean Time.	Hour Angle, H	Y	z'	y'	N.	S.
		$\Delta\alpha$	$\Delta\delta$								
X Sagitt. (var.)	4.4	-0.71	-7.2	-27 48.5	12 11 32.3	+ 3 15.3	-0.4238	0.5612	-0.0333	-5	-73
10 G. Sagittarii	5.7	0.74	7.4	28 03.4	15 23.9	+ 6 58.4	-0.2638	0.5609	0.0227	+3	-61
210 B. Scorpil	5.8	0.76	7.2	28 45.3	16 13.0	+ 7 45.7	+0.4709	0.5609	0.0204	+43	-18
38 B. Sagittarii	4.7	0.78	7.5	28 28.1	20 12.9	+11 36.8	+0.1023	0.5604	0.0094	+21	-39
C.D.—28° 14268	6.4	0.80	7.5	28 55.2	21 51.5	-10 48.2	+0.5792	0.5602	-0.0049	+49	-12
48 G. Sagittarii	6.3	-0.80	-7.8	-28 18.9	18 00 10.2	- 8 34.5	-0.0792	0.5599	+0.0014	+10	-49
62 B. Sagittarii	6.0	0.81	7.7	28 40.7	00 10.4	- 8 34.3	+0.3142	0.5599	0.0014	+31	-27
58 G. Sagittarii	6.1	0.82	7.8	28 27.9	02 08.0	- 6 40.9	+0.0912	0.5594	0.0068	+20	-40
7 Sagittarii	3.5	0.92	8.9	27 46.5	21 29.5	+11 58.7	-0.0240	0.5536	0.0583	+18	-46
183 B. Sagittarii	6.2	0.93	8.6	28 44.8	21 43.6	-11 47.7	+1.0498	0.5535	0.0589	+62	+21
234 B. Sagittarii	5.9	-0.96	-9.1	-28 00.2	14 05 11.7	- 4 35.4	+0.7502	0.5502	+0.0778	+62	-2
248 B. Sagittarii	5.7	0.96	9.3	27 07.8	07 35.1	- 2 17.1	-0.0108	0.5490	0.0837	+22	-45
ω Sagittarii	4.8	0.99	9.8	26 29.2	19 15.1	+ 8 58.9	+0.4241	0.5428	0.1113	+48	-21
A Sagittarii	4.9	1.00	9.8	26 23.2	20 40.6	+10 21.5	+0.4753	0.5420	0.1146	+51	-18
40 B. Capricorni	6.2	1.02	10.3	25 10.9	15 12 27.3	+ 1 36.6	+1.2303	0.5323	0.1481	+65	+36
20 Piscium	5.6	-0.91	-7.0	-3 08.8	19 20 07.6	+ 6 18.4	-0.5260	0.4826	+0.2592	+17	-76
24 Piscium	6.1	0.89	6.8	3 32.4	22 59.6	+ 9 05.9	-0.6553	0.4822	0.2598	+83	-11
80 B. Piscium	6.3	0.88	6.0	-0 53.4	20 05 59.2	- 8 05.4	-0.4709	0.4818	0.2608	+20	-72
98 B. Piscium	6.3	0.87	5.0	+1 18.2	13 18.9	-0 57.2	-0.9895	0.4818	0.2611	-8	-89
44 Piscium	6.1	0.85	4.7	1 33.4	17 41.8	+ 3 18.7	-0.1251	0.4819	0.2610	+38	-51
147 B. Piscium	5.9	-0.80	-3.2	+4 55.5	21 06 48.7	- 7 55.1	-0.4455	0.4838	+0.2588	+22	-69
URANUS	6.2	..	..	4 32.7	09 07.0	- 5 40.4	+0.5714	0.4824	0.2573	+80	-15
171 B. Piscium	6.3	0.78	2.2	6 06.6	13 20.3	- 1 33.9	-0.0731	0.4853	0.2568	+41	-48
ϵ Piscium	4.4	0.78	1.8	7 31.1	15 05.9	+ 0 08.9	-1.1770	0.4858	0.2561	-21	-83
ζ Piscium	5.3	0.73	-1.4	7 12.6	21 09.2	+ 6 02.4	+0.7064	0.4877	0.2535	+90	-6
π Piscium	5.6	-0.69	+0.9	+11 47.4	22 10 04.2	- 5 23.8	-1.1052	0.4930	+0.2461	-16	-79
12 H ¹ Arietis	6.3	0.58	2.3	13 08.7	23 47.3	+ 7 56.0	+0.7130	0.5004	0.2352	+90	-3
19 Arietis	5.8	0.55	3.3	14 57.5	23 05 16.9	-10 43.8	+0.0087	0.5038	0.2299	+45	-39
27 Arietis	6.4	0.48	4.8	17 24.0	14 28.6	- 1 48.4	-0.5836	0.5101	0.2198	+14	-69
36 Arietis	6.5	0.41	5.3	17 28.4	21 14.4	+ 4 45.1	+0.7949	0.5152	0.2113	+90	+5
40 Arietis	6.0	-0.39	+5.6	+17 59.9	23 20.0	+ 6 46.8	+0.6643	0.5168	+0.2085	+90	-2
47 Arietis	5.8	0.36	6.7	20 23.7	24 04 00.2	+11 18.4	-0.9702	0.5206	0.2020	-10	-70
ζ Arietis	4.8	0.26	7.4	20 47.5	12 07.0	- 4 50.3	+0.1918	0.5274	0.1894	+56	-24
τ Arietis	5.1	0.22	7.6	20 54.1	15 06.5	- 1 56.6	+0.6323	0.5301	0.1844	+89	0
63 Arietis	5.2	0.20	7.5	20 29.9	15 50.1	- 1 14.5	+1.1983	0.5307	0.1831	+90	+37
65 Arietis	6.0	-0.19	+7.5	+20 33.7	16 37.3	- 0 28.8	+1.2734	0.5314	+0.1818	+84	+45
66 Arietis	6.1	0.19	8.3	22 34.2	18 28.3	+ 1 18.5	-0.5497	0.5331	0.1785	+15	-62
16 Tauri	5.4	0.09	9.3	24 04.6	25 01 58.5	+ 8 33.7	-0.8726	0.5399	0.1645	-5	-66
17 Tauri	3.8	0.09	9.2	23 54.0	02 00.6	+ 8 35.7	-0.6788	0.5399	0.1644	+7	-66
9 Tauri	4.3	0.09	9.3	24 15.3	02 09.4	+ 8 44.3	-1.0338	0.5400	0.1641	-16	-66
20 Tauri	4.1	-0.08	+9.3	+24 09.4	02 26.3	+ 9 00.6	-0.8817	0.5403	+0.1636	-5	-66
21 Tauri	5.8	0.09	9.4	24 20.6	02 28.4	+ 9 02.6	-1.0759	0.5403	0.1635	-19	-66
22 Tauri	6.5	0.08	9.4	24 19.0	02 32.2	+ 9 06.3	-1.0372	0.5404	0.1634	-16	-66
23 Tauri	4.3	0.08	9.2	23 44.2	02 40.2	+ 9 14.0	-0.3962	0.5405	0.1631	+23	-51
7 Tauri	2.9	0.07	9.2	23 53.7	03 11.6	+ 9 44.3	-0.4805	0.5410	0.1621	+19	-56
104 B. Tauri	5.5	-0.06	+9.0	+23 12.8	03 35.4	+10 07.3	+0.3128	0.5414	+0.1613	+64	-15
27 Tauri	3.7	0.06	9.3	23 50.8	03 57.0	+10 28.1	-0.3054	0.5417	0.1606	+28	-46
28 Tauri	5.2	-0.06	9.3	23 55.8	03 57.6	+10 28.7	-0.3929	0.5417	0.1606	+23	-51
33 Tauri	6.0	0.00	9.1	22 58.8	07 30.3	-10 05.9	+1.1765	0.5450	0.1533	+90	+39
36 Tauri	5.6	+0.04	9.6	23 55.2	10 43.6	- 6 59.2	+0.6565	0.5480	0.1465	+90	+5
X Tauri	5.3	+0.16	+10.4	+25 28.2	18 38.0	+ 0 38.3	+0.0978	0.5552	+0.1286	+50	-21
17 B. Aurigæ	6.0	+0.38	+11.3	+27 47.2	26 07 18.7	-11 09.0	-0.9066	0.5664	+0.0969	-9	-63

New Moon—Feb. 17^d 13^h 10^m 8^sFirst Quarter—Feb. 25^d 16^h 41^m 9^s

FEBRUARY.

THE STAR'S					AT CONJUNCTION IN R.A.					Limiting Parallels.	
Name.	Mag.	Reductions from 1931.0.		Apparent Declina- tion.	Greenwich Mean Time.	Hour Angle, H	Y	π'	γ'	N.	S.
		$\Delta\alpha$	$\Delta\delta$								
38 B. Aurigæ	6.5	+0.46	+11.3	+27 36.2	28 12 10.3	- 6 28.5	-0.2740	0.5704	+0.0838	+29	-36
47 B. Aurigæ	6.0	0.50	11.4	27 56.9	14 14.6	- 4 29.0	-0.4661	0.5721	0.0781	+19	-47
354 B. Tauri	6.4	0.58	11.3	27 53.5	18 46.2	- 0 07.9	-0.0818	0.5755	0.0652	+40	-24
22 Aurigæ	6.4	0.60	11.6	28 52.6	19 42.7	+ 0 46.4	-1.0458	0.5762	0.0625	-20	-62
β Tauri	1.7	0.62	11.4	28 33.2	20 52.5	+ 1 53.5	-0.6394	0.5770	0.0591	+ 8	-57
107 B. Aurigæ	6.5	+0.69	+11.0	+27 37.3	27 00 42.4	+ 5 34.5	+0.5346	0.5797	+0.0478	+82	+ 8
116 B. Aurigæ	5.9	0.72	11.5	29 10.8	02 01.0	+ 6 49.9	-1.0219	0.5806	0.0439	-18	-61
406 B. Tauri	5.6	0.80	10.9	27 57.1	06 36.0	+11 14.0	+0.4197	0.5834	0.0299	+72	+ 4
136 Tauri	4.6	0.81	10.8	27 36.0	07 31.4	-11 52.9	+0.8087	0.5839	0.0271	+90	+25
154 B. Aurigæ	6.4	0.84	11.1	28 56.2	08 45.7	-10 41.6	-0.5391	0.5847	0.0232	+14	-47
415 B. Tauri	6.1	+0.86	+10.6	+27 34.4	10 30.2	- 9 01.3	+0.9019	0.5856	+0.0178	+90	+32
183 B. Aurigæ	6.3	0.91	11.1	29 31.4	12 33.0	- 7 03.4	-1.0760	0.5867	0.0113	-23	-61
κ Aurigæ	4.4	0.97	10.8	29 31.7	16 00.9	- 3 44.0	-1.0590	0.5883	+0.0003	-22	-61
211 B. Aurigæ	6.3	1.02	10.7	29 34.6	18 14.4	- 1 35.8	-1.1147	0.5892	-0.0068	-27	-61
49 Aurigæ	5.1	1.09	9.8	28 04.8	23 36.0	+ 3 32.5	+0.3356	0.5911	0.0241	+66	+ 1
53 Aurigæ	5.6	+1.12	+10.0	+29 02.9	28 00 47.9	+ 4 41.4	-0.6834	0.5915	-0.0281	+ 5	-58
54 Aurigæ	5.8	1.12	9.8	28 19.7	01 15.0	+ 5 07.4	+0.0380	0.5916	0.0295	+47	-15
28 Geminorum	5.5	1.17	9.8	29 02.7	03 13.0	+ 7 00.5	-0.7567	0.5921	0.0359	+ 1	-61
47 Geminorum	5.6	1.30	8.2	26 58.4	13 18.6	- 7 18.9	+0.8176	0.5937	0.0689	+90	+22
53 Geminorum	5.9	1.35	8.3	28 01.3	15 01.3	- 5 40.5	-0.3651	0.5938	0.0744	+24	-40
134 B. Geminorum	6.5	+1.34	+ 7.9	+26 49.0	15 27.1	- 5 15.8	+0.8194	0.5937	-0.0758	+90	+22
59 Geminorum	5.7	1.39	7.8	27 46.5	18 16.4	- 2 33.5	-0.3747	0.5938	0.0850	+24	-42
ϵ Geminorum	3.8	1.40	7.8	27 56.3	18 43.0	- 2 08.0	-0.5780	0.5937	0.0864	+12	-54
b^1 Geminorum	5.0	1.43	7.7	28 15.8	20 04.5	- 0 49.9	-1.0253	0.5937	0.0907	-18	-62
b^2 Geminorum	5.0	1.43	7.6	28 03.7	20 15.3	- 0 39.5	-0.8381	0.5937	0.0913	- 4	-62
ν Geminorum	4.3	+1.44	+ 7.1	+27 03.2	22 34.6	+ 1 34.0	-0.0417	0.5936	-0.0988	+42	-25

MARCH.

ϵ Geminorum	5.5	+1.47	+ 6.4	+25 57.1	1 01 41.3	+ 4 33.0	+0.7417	0.5931	-0.1086	+90	+15
ϕ Geminorum	4.9	1.53	6.2	26 56.9	05 14.1	+ 7 57.1	-0.6630	0.5925	0.1197	+ 7	-61
ω Cancræ	6.1	1.54	5.4	25 35.1	08 04.5	+10 40.3	+0.3495	0.5918	0.1285	+67	- 8
4 Cancræ	6.2	1.54	5.3	25 16.9	08 23.0	+10 58.1	+0.6120	0.5918	0.1294	+89	+ 6
MARS	-0.4	..	..	24 26.4	10 20.0	-11 09.7	+1.1988	0.5970	0.1352	+89	+45
ψ Cancræ	5.9	+1.59	+ 4.9	+25 43.2	11 42.4	- 9 50.7	-0.2722	0.5908	-0.1395	+30	-40
λ Cancræ	5.9	1.61	4.0	24 14.5	15 34.9	- 6 07.7	+0.6378	0.5896	0.1510	+90	+ 5
28 Cancræ	6.1	1.64	3.6	24 22.6	18 41.2	- 3 09.0	+0.0210	0.5884	0.1600	+46	-27
ν^1 Cancræ	5.7	1.65	3.4	24 18.9	19 48.4	- 2 04.5	-0.1001	0.5880	0.1631	+39	-34
ν^2 Cancræ	6.4	1.66	3.3	24 19.3	20 23.0	- 1 31.4	-0.2001	0.5877	0.1647	+34	-40
ξ Cancræ	5.2	+1.74	+ 0.7	+22 19.6	2 10 36.7	-11 51.7	-0.8398	0.5809	-0.2024	- 2	-68
79 Cancræ	6.1	1.75	0.7	22 16.7	11 00.2	-11 29.1	-0.8716	0.5807	0.2033	- 4	-68
90 H ¹ Cancræ	6.1	1.74	+ 0.4	21 34.1	12 18.5	-10 13.9	-0.4394	0.5800	0.2065	+21	-57
57 B. Leonis	6.5	1.77	- 1.9	19 10.9	3 00 44.6	+ 1 43.2	-0.8322	0.5730	0.2340	0	-71
107 B. Leonis	6.3	1.74	3.6	16 05.6	09 28.1	+10 06.9	+0.0788	0.5679	0.2505	+49	-34
η Leonis	3.6	+1.76	- 3.6	+17 05.9	10 08.6	+10 45.9	-1.0746	0.5675	-0.2517	-16	-73
37 Leonis	5.5	1.72	4.4	14 04.3	14 03.4	+ 9 28.1	+0.8889	0.5652	0.2581	+90	+ 7
42 Leonis	6.1	1.75	4.6	15 19.4	16 12.9	- 7 23.4	-0.8946	0.5640	0.2615	- 3	-75
46 Leonis	5.8	1.74	5.3	14 29.4	20 35.5	- 3 10.4	-1.2393	0.5616	0.2678	-29	-76
ι Leonis	5.2	1.69	6.5	10 54.5	4 03 53.2	+ 3 51.3	+0.2700	0.5578	0.2769	+60	-28
308 B. Leonis	5.8	+1.65	- 7.9	+ 8 26.2	14 38.1	- 9 46.8	-0.3514	0.5528	-0.2870	+27	-62
σ Leonis	4.2	1.62	8.2	6 24.3	17 45.6	- 6 45.9	+0.7300	0.5514	0.2893	+90	- 7
β Virginis	3.8	1.55	9.4	2 09.1	5 06 50.0	+ 5 51.1	+1.0608	0.5469	0.2952	+90	+13
27 B. Virginis	6.5	+1.51	- 9.6	+ 0 54.7	10 36.0	+ 9 29.2	+1.1605	0.5459	-0.2958	+90	+20

Full Moon—Mar. 4^d 10^h 36^m.1

THE STAR'S					AT CONJUNCTION IN R.A.					Limiting Parallels.	
Name.	Mag.	Reductions from 1931.0.		Apparent Declina- tion.	Greenwich Mean Time.	Hour Angle, H	Y	x'	y'	N.	S.
		$\Delta\alpha$	$\Delta\delta$								
13 Virginis	5.9	+1.47	-10.3	-0 24.4	5 19 24.6	-6 00.3	-0.1545	0.5441	-0.2957	+37	-53
η Virginis	4.0	1.47	10.4	0 17.2	19 58.2	-5 27.8	-0.4380	0.5440	0.2956	+23	-70
ϵ Virginis	5.6	1.29	10.8	8 37.1	6 17 55.9	-8 15.1	+1.3757	0.5428	0.2847	+79	+41
δ Virginis	5.4	1.22	11.2	9 48.8	7 04 56.4	+2 22.8	-0.5153	0.5438	0.2741	+17	-76
86 Virginis	5.6	1.18	10.9	12 05.1	10 45.0	+7 59.5	+0.1756	0.5446	0.2672	+50	-36
621 B. Virginis	6.4	+1.10	-10.7	-14 38.6	18 59.9	-8 02.7	+0.5812	0.5464	-0.2559	+72	-15
40 H. Virginis	5.1	1.08	10.4	15 58.8	21 49.6	-5 18.8	+1.2070	0.5470	0.2516	+75	+26
64 G. Libræ	5.8	0.84	9.4	22 08.9	9 02 23.5	-1 45.6	+1.0189	0.5554	0.1981	+68	+14
169 B. Libræ	6.0	0.76	9.3	22 55.0	11 32.0	+7 03.0	+0.0950	0.5581	0.1774	+36	-40
177 B. Libræ	6.2	0.75	9.3	22 55.7	12 11.6	+7 41.2	-0.0093	0.5583	0.1758	+30	-45
42 Libræ	5.0	+0.75	-9.1	-23 35.9	12 34.7	+8 03.5	+0.6139	0.5584	-0.1750	+63	-11
Λ Scorpii	4.6	0.69	8.6	25 07.5	18 12.2	-10 31.4	+1.2503	0.5600	0.1614	+65	+38
31 B. Scorpii	5.4	0.69	8.9	24 19.9	18 20.0	-10 23.9	+0.4077	0.5600	0.1611	+51	-22
32 B. Scorpii	5.3	0.69	9.1	23 46.6	18 21.2	-10 22.7	-0.1710	0.5600	0.1610	+21	-55
3 Scorpii	5.9	0.69	8.7	25 02.6	18 38.7	-10 05.8	+1.0949	0.5600	0.1603	+65	+22
40 B. Scorpii	5.4	+0.67	-8.8	-24 38.2	20 18.2	-8 30.0	+0.4113	0.5605	-0.1561	+51	-22
48 B. Scorpii	4.9	0.65	8.5	25 40.6	22 17.9	-6 34.7	+1.1864	0.5610	0.1511	+65	+31
50 B. Scorpii	6.4	0.65	8.9	24 32.4	22 33.0	-6 20.2	-0.0322	0.5610	0.1505	+27	-47
24 G. Scorpii	6.2	0.64	9.0	24 16.9	10 00 12.8	-4 44.1	-0.5481	0.5614	0.1463	+1	-82
41 G. Scorpii	6.3	0.61	9.0	24 15.0	02 41.1	-2 21.3	-0.9364	0.5620	0.1400	-23	-90
85 B. Scorpii	6.0	+0.61	-8.6	-25 18.3	03 08.8	-1 54.6	+0.0993	0.5621	-0.1388	+32	-39
σ Scorpii	3.0	0.58	8.6	25 25.9	05 46.8	+0 37.5	-0.1258	0.5626	0.1319	+20	-52
α Sco. (Antares)	1.3	0.55	8.4	26 17.0	09 12.0	+3 55.1	+0.3288	0.5632	0.1229	+43	-26
116 B. Scorpii	6.2	0.54	8.3	26 23.5	10 01.4	+4 42.6	-0.3424	0.5634	0.1207	+43	-26
134 B. Scorpii	6.4	0.49	8.0	27 19.8	15 23.0	+9 52.3	+0.7211	0.5642	0.1062	+63	-4
95 G. Ophiuchi	6.1	+0.37	-7.9	-27 40.8	11 03 03.0	-2 53.7	+0.0412	0.5650	-0.0739	+23	-42
43 G. Ophiuchi	5.4	0.33	7.8	28 04.8	07 34.9	+1 27.9	+0.1588	0.5649	0.0612	+28	-36
163 G. Ophiuchi	6.3	0.24	7.8	27 51.3	15 51.9	+9 26.3	-0.4917	0.5642	0.0378	-7	-78
χ Sagitt. (var.)	4.4	0.23	7.8	27 48.5	17 38.5	+11 09.0	-0.6043	0.5640	0.0327	-14	-89
10 G. Sagittarii	5.7	0.19	7.7	28 03.4	21 26.7	-9 11.3	-0.4434	0.5633	0.0220	-6	-74
210 B. Scorpii	5.8	+0.18	-7.4	-28 45.3	22 15.2	-8 24.6	+0.2862	0.5631	-0.0197	+31	-28
ω Sagitt. (var.)	4.3	0.16	7.1	29 35.2	12 00 54.2	-5 51.6	+1.1363	0.5626	0.0123	+61	+30
38 B. Sagittarii	4.7	0.15	7.5	28 28.1	02 12.1	-4 36.5	-0.0768	0.5622	0.0087	+11	-49
C. D.—28° 14268	6.4	0.13	7.4	28 55.2	03 49.5	-3 02.8	+0.3979	0.5618	-0.0041	+36	-22
48 G. Sagittarii	6.3	0.11	7.6	28 18.9	06 06.7	-0 50.6	-0.2543	0.5612	+0.0023	+1	-60
62 B. Sagittarii	6.0	+0.11	-7.4	-28 40.7	06 06.9	-0 50.4	+0.1366	0.5612	+0.0023	+22	-37
58 G. Sagittarii	6.1	+0.09	7.5	28 27.9	08 03.3	+1 01.7	-0.0835	0.5606	0.0077	+11	-50
τ Sagittarii	3.5	-0.09	7.6	27 46.5	18 03 16.6	-4 26.8	-0.1825	0.5529	0.0593	+10	-56
183 B. Sagittarii	6.2	0.09	7.2	28 44.8	03 30.7	-4 13.2	+0.8871	0.5528	0.0599	+62	+8
234 B. Sagittarii	5.9	0.15	7.4	28 00.1	10 57.3	+2 57.6	+0.5960	0.5489	0.0787	+55	-11
248 B. Sagittarii	5.7	-0.17	-7.6	-27 07.8	13 20.4	+5 15.7	-0.1603	0.5476	+0.0846	+14	-54
ω Sagittarii	4.8	0.26	7.6	26 29.2	14 01 00.1	-7 28.7	+0.2852	0.5407	0.1121	+40	-29
Λ Sagittarii	4.9	0.27	7.6	26 23.1	02 25.7	-6 06.0	+0.3379	0.5398	0.1153	+43	-26
40 B. Capricorni	6.2	0.38	7.7	25 10.8	18 14.6	+9 11.4	+1.1102	0.5296	0.1487	+65	+23
56 B. Capricorni	6.3	0.40	7.8	24 01.8	21 44.0	-11 25.9	+0.3733	0.5273	0.1554	+49	-24
χ Capricorni	5.3	-0.49	-8.2	-21 28.4	15 11 37.7	+2 01.6	-0.1119	0.5183	+0.1802	+27	-51
27 Capricorni	6.1	0.50	8.3	20 50.2	12 07.4	+2 30.3	-0.7275	0.5179	0.1810	-5	-90
ϕ Capricorni	5.3	0.51	8.2	20 56.5	15 09.9	+5 27.2	-0.0539	0.5160	0.1860	+31	-48
33 Capricorni	5.3	0.53	8.0	21 08.9	19 27.9	+9 37.4	+0.9896	0.5133	0.1926	+69	+11
128 B. Capricorni	6.5	0.55	8.2	19 27.1	22 26.9	-11 28.9	-0.3080	0.5115	0.1971	+19	-63
37 Capricorni	5.7	-0.56	-8.0	-20 23.7	16 00 56.0	-9 04.3	+1.2318	0.5100	+0.2007	+70	+32
ϵ Capricorni	4.7	-0.56	-8.0	-19 46.7	02 05.0	-7 57.4	+0.7800	0.5093	+0.2023	+71	-3

Last Quarter—Mar. 11^d 05^h 15^m.2

ELEMENTS OF OCCULTATIONS, 1931.

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MARCH.

THE STAR'S					AT CONJUNCTION IN R.A.					Limiting Parallels.	
Name.	Mag.	Reductions from 1931-0.		Apparent Declina- tion.	Greenwich Mean Time.	Hour Angle, H	Y	α'	γ'	N.	S.
		$\Delta\alpha$	$\Delta\delta$								
κ Capricorni	4.8	-0.58	-8.1	-19 11.0	16 04 58.1	-5 09.4	+0.7104	0.5076	+0.2063	+71	-7
152 B. Capricorni	6.5	0.60	8.3	17 10.2	08 55.8	-1 18.6	+0.6958	0.5053	0.2115	+2	-90
29 Aquarii (mean)	6.5	0.62	8.0	17 18.0	15 22.7	+4 57.1	+0.8379	0.5018	0.2194	+73	0
39 Aquarii	6.2	0.66	8.3	14 32.2	20 44.2	+10 09.4	+1.0400	0.4991	0.2255	-18	-90
50 Aquarii	5.9	0.68	8.1	13 52.9	17 03 14.4	-7 31.4	+0.2792	0.4960	0.2322	+26	-61
182 B. Aquarii	6.2	-0.69	-8.0	-13 16.3	06 16.9	-4 34.0	+0.2474	0.4946	+0.2351	+27	-59
π Piscium	5.6	0.88	-0.3	+11 47.3	21 15 59.6	+2 19.0	+1.0119	0.4947	0.2478	-10	-79
12 H ¹ . Arietis	6.3	0.82	+1.0	13 08.7	22 05 41.2	-8 22.7	+0.8188	0.5016	0.2366	+90	+2
19 Arietis	5.8	0.81	1.9	14 57.5	11 10.6	-3 02.8	+0.1164	0.5049	0.2311	+51	-34
27 Arietis	6.4	0.78	3.2	17 24.0	20 22.6	+5 52.9	+0.4732	0.5108	0.2207	+20	-63
36 Arietis	6.5	-0.73	+3.8	+17 28.4	23 03 09.3	-11 32.6	+0.9134	0.5155	+0.2120	+90	+12
40 Arietis	6.0	0.72	4.1	17 59.9	05 15.2	-9 30.5	+0.7832	0.5170	0.2091	+90	+4
47 Arietis	5.8	0.70	5.1	20 23.7	09 56.6	-4 57.8	+0.8573	0.5204	0.2023	-2	-70
6 Arietis	4.8	0.63	5.8	20 47.5	18 06.1	+2 56.4	+0.3126	0.5266	0.1894	+63	-18
7 Arietis	5.1	0.60	6.1	20 54.1	21 06.9	+5 51.4	+0.7565	0.5290	0.1843	+90	+6
66 Arietis	6.1	-0.58	+6.8	+22 34.2	24 00 30.3	+9 08.0	+0.4324	0.5316	+0.1784	+21	-55
16 Tauri	5.4	0.51	7.8	24 04.6	08 04.9	-7 32.5	+0.7577	0.5377	0.1641	+3	-66
17 Tauri	3.8	0.51	7.8	23 54.0	08 07.0	-7 30.5	+0.5623	0.5377	0.1640	+14	-61
18 Tauri	5.6	0.52	8.0	24 37.6	08 14.4	-7 23.2	+1.3248	0.5379	0.1638	-54	-63
9 Tauri	4.3	0.51	7.9	24 15.3	08 15.9	-7 21.8	+0.9200	0.5379	0.1637	-8	-66
20 Tauri	4.1	-0.51	+7.9	+24 09.3	08 33.0	-7 05.3	+0.7669	0.5381	+0.1632	+2	-66
21 Tauri	5.8	0.51	8.0	24 20.6	08 35.1	-7 03.3	+0.9625	0.5381	0.1631	-11	-66
22 Tauri	6.5	0.51	8.0	24 19.0	08 39.0	-6 59.5	+0.9235	0.5382	0.1630	-8	-66
23 Tauri	4.3	0.50	7.8	23 44.2	08 47.0	-6 51.8	+0.2776	0.5383	0.1627	+30	-45
7 Tauri	2.9	0.50	7.9	23 53.7	09 18.7	-6 21.2	+0.3626	0.5387	0.1616	+25	-49
104 B. Tauri	5.5	-0.48	+7.7	+23 12.8	09 42.8	-5 57.7	+0.4369	0.5390	+0.1609	+72	-8
27 Tauri	3.7	0.48	7.9	23 50.8	10 04.7	-5 36.6	+0.1860	0.5393	0.1601	+35	-40
28 Tauri	5.2	0.49	8.0	23 55.8	10 05.3	-5 36.1	+0.2743	0.5393	0.1601	+30	-45
36 Tauri	5.6	0.40	8.4	23 55.2	16 56.4	+1 01.0	+0.7841	0.5448	0.1458	+90	+12
χ Tauri	5.3	0.30	9.3	25 28.2	25 00 57.9	+8 45.7	+0.2202	0.5511	0.1278	+58	-15
17 B. Aurigæ	6.0	-0.11	+10.7	+27 47.2	13 52.7	-2 47.5	+0.7976	0.5608	+0.0960	-1	-63
38 B. Aurigæ	6.5	-0.03	10.8	27 36.2	18 50.5	+1 59.3	+0.1588	0.5642	0.0829	+36	-30
47 B. Aurigæ	6.0	0.00	10.9	27 56.9	20 57.6	+4 01.6	+0.3538	0.5656	0.0771	+25	-40
354 B. Tauri	6.4	+0.08	11.0	27 53.5	20 35.6	+8 29.1	+0.0341	0.5686	0.0643	+47	-18
22 Aurigæ	6.4	0.10	11.3	28 52.5	02 33.6	+9 24.9	+0.9430	0.5691	0.0616	-12	-62
β Tauri	1.7	+0.12	+11.2	+28 33.2	03 45.1	+10 33.8	+0.5316	0.5698	+0.0582	+15	-50
107 B. Aurigæ	6.5	0.19	10.9	27 37.3	07 41.0	-9 39.4	+0.6571	0.5720	0.0470	+90	+15
116 B. Aurigæ	5.9	0.22	11.5	29 10.8	09 01.6	-8 21.9	+0.9214	0.5727	0.0431	-10	-61
406 B. Tauri	5.6	0.30	11.0	27 57.1	13 44.1	-3 50.3	+0.5391	0.5751	0.0293	+83	+11
136 Tauri	4.6	0.32	10.9	27 36.0	14 41.1	-2 55.6	+0.9335	0.5755	0.0264	+90	+33
154 B. Aurigæ	6.4	+0.34	+11.4	+28 56.2	15 57.6	-1 42.1	+0.4345	0.5761	+0.0226	+20	-40
415 B. Tauri	6.1	0.37	10.8	27 34.4	17 45.1	+0 01.2	+1.0272	0.5768	0.0172	+90	+40
183 B. Aurigæ	6.3	0.42	11.5	29 31.4	19 51.5	+2 02.7	+0.9812	0.5776	+0.0109	-15	-61
κ Aurigæ	4.4	0.48	11.3	29 31.7	23 25.8	+5 28.5	+0.9656	0.5790	0.0000	-14	-61
211 B. Aurigæ	6.3	0.53	11.3	29 34.6	27 01 43.4	+7 40.7	+1.0233	0.5797	-0.0070	-19	-61
49 Aurigæ	5.1	+0.63	+10.6	+28 04.8	07 15.3	-11 00.6	+0.4474	0.5811	-0.0241	+75	+7
53 Aurigæ	5.6	0.66	10.8	29 02.9	08 29.5	-9 49.3	+0.5885	0.5813	0.0280	+11	-51
54 Aurigæ	5.8	0.66	10.6	28 19.7	08 57.5	-9 22.4	+0.1444	0.5814	0.0294	+53	-10
28 Geminorum	5.5	0.70	10.7	29 02.6	10 59.4	-7 25.4	+0.6642	0.5818	0.0357	+7	-57
47 Geminorum	5.6	0.87	9.3	26 58.4	21 25.8	+2 36.0	+0.9312	0.5827	0.0681	+90	+29
53 Geminorum	5.9	+0.92	+9.5	+28 01.3	23 12.1	+4 18.0	+0.2724	0.5827	-0.0736	+29	-35
134 B. Geminorum	6.5	+0.91	+9.0	+26 49.1	23 38.8	+4 43.7	+0.9319	0.5827	-0.0749	+90	+29

New Moon—Mar. 19^d 07^h 50^m 6First Quarter—Mar. 27^d 05^h 04^m 2

MARCH.

THE STAR'S					AT CONJUNCTION IN R.A.					Limiting Parallels.	
Name.	Mag.	Reductions from 1931.0.		Apparent Declina- tion.	Greenwich Mean Time.	Hour Angle, H	Y	x'	y'	N.	S.
		$\Delta\alpha$	$\Delta\delta$								
59 Geminorum	5.7	+0.97	+ 9.2	+27 46.5	28 02 34.1	+ 7 32.0	-0.2840	0.5825	-0.0839	+29	-37
ϵ Geminorum	3.8	0.98	9.2	27 56.4	03 01.7	+ 7 58.5	-0.4910	0.5825	0.0853	+17	-49
b^1 Geminorum	5.0	1.01	9.1	28 15.9	04 26.1	+ 9 19.5	-0.9466	0.5824	0.0896	-12	-62
b^2 Geminorum	5.0	1.01	9.1	28 03.7	04 37.3	+ 9 30.4	-0.7564	0.5823	0.0902	+ 1	-62
v Geminorum	4.3	1.04	8.5	27 03.2	07 01.6	+11 48.9	+0.0522	0.5821	0.0975	+48	-21
c Geminorum	5.5	+1.08	+ 7.8	+25 57.1	10 15.1	- 9 05.3	+0.8472	0.5816	-0.1071	+90	+21
ϕ Geminorum	4.9	1.16	7.8	26 56.9	13 55.7	- 5 33.5	-0.5836	0.5809	0.1180	+12	-57
ω Geminorum	6.1	1.19	7.0	25 35.1	16 52.2	- 2 43.9	+0.4444	0.5802	0.1266	+74	- 3
4 Cancri	6.2	1.19	6.9	25 17.0	17 11.5	- 2 25.5	+0.7111	0.5802	0.1275	+90	+11
ψ Cancri	5.9	1.25	6.5	25 43.2	20 38.2	+ 0 53.1	-0.1902	0.5792	0.1374	+34	-36
λ Cancri	5.9	+1.29	+ 5.6	+24 14.5	29 00 39.1	+ 4 44.4	+0.7324	0.5780	-0.1487	+90	+10
28 Cancri	6.1	1.34	5.3	24 22.6	03 52.2	+ 7 50.0	+0.1031	0.5769	0.1576	+51	-23
v^1 Cancri	5.7	1.35	5.1	24 19.0	05 01.8	+ 8 56.8	-0.0208	0.5765	0.1607	+44	-30
v^2 Cancri	6.4	1.36	5.0	24 19.3	05 37.6	+ 9 31.3	-0.1228	0.5763	0.1623	+38	-36
ξ Cancri	5.2	1.52	+ 2.5	22 19.6	20 21.4	- 0 18.9	-0.7831	0.5702	0.1995	+ 2	-68
79 Cancri	6.1	+1.53	+ 2.4	+22 16.7	20 45.8	+ 0 04.5	-0.8157	0.5700	-0.2004	0	-68
90 H. Cancri	6.1	1.53	+ 2.0	21 34.1	22 06.7	+ 1 22.3	-0.3778	0.5694	0.2036	+25	-53
57 B. Leonis	6.5	1.62	- 0.4	19 10.9	30 10 56.8	-10 16.4	-0.7860	0.5634	0.2311	+ 2	-71
107 B. Leonis	6.3	1.66	2.4	16 05.6	19 55.6	- 1 37.4	+0.1293	0.5593	0.2477	+52	-32
η Leonis	3.6	1.68	2.3	17 06.0	20 37.1	- 0 57.4	-1.0388	0.5590	0.2489	-13	-73
37 Leonis	5.5	+1.66	- 3.5	+14 04.3	31 00 38.2	+ 2 54.9	+0.9444	0.5573	-0.2554	+90	+10
42 Leonis	6.1	1.70	3.6	15 19.4	02 51.0	+ 5 02.9	-0.8615	0.5563	0.2589	- 1	-75
46 Leonis	5.8	1.72	4.3	14 29.4	07 19.9	+ 9 22.2	-1.2133	0.5545	0.2654	-25	-76
l Leonis	5.2	+1.71	- 6.0	+10 54.5	14 47.1	- 7 26.6	+0.3040	0.5517	-0.2749	+62	-26

APRIL.

308 B. Leonis	5.8	+1.73	- 7.8	+ 8 26.2	1 01 43.2	+ 3 06.6	-0.3330	0.5483	-0.2858	+28	-62
σ Leonis	4.2	1.72	8.5	6 24.3	04 53.3	+ 6 10.1	+0.7518	0.5474	0.2882	+90	- 5
β Virginis	3.8	1.73	10.4	2 09.0	18 05.3	- 5 05.2	+1.0684	0.5450	0.2951	+90	+14
27 B. Virginis	6.5	1.71	10.8	+ 0 54.7	21 52.5	- 1 25.9	+1.1638	0.5447	0.2961	+90	+19
13 Virginis	5.9	1.72	11.8	- 0 24.4	2 06 42.2	+ 7 05.6	-0.1619	0.5442	0.2967	+37	-54
η Virginis	4.0	+1.72	-11.8	- 0 17.2	07 15.8	+ 7 38.1	-0.4459	0.5442	-0.2967	+23	-70
g Virginis	5.6	1.68	13.4	8 37.1	3 05 05.1	+ 4 42.3	+1.3420	0.5464	0.2874	+83	+37
a Virg. (<i>Spica</i>)	1.2	1.66	13.7	10 48.3	12 29.2	+11 51.1	+1.3955	0.5481	0.2810	+73	+47
h Virginis	5.4	1.67	13.9	9 48.8	15 56.1	- 8 49.3	-0.5462	0.5490	0.2775	+15	-78
86 Virginis	5.6	1.65	13.9	12 05.1	21 38.4	- 3 18.9	+0.1358	0.5507	0.2708	+48	-38
621 B. Virginis	6.4	+1.63	-13.9	-14 38.7	4 05 43.0	+ 4 28.6	+0.5324	0.5534	-0.2597	+69	-17
40 H. Virginis	5.1	1.63	13.8	15 58.8	08 28.8	+ 7 08.5	+1.1502	0.5544	0.2556	+75	+21
64 G. Libræ	5.8	1.55	12.6	22 08.9	5 12 15.6	+ 9 54.6	+0.9497	0.5650	0.2018	+68	+ 9
169 B. Libræ	6.0	1.52	12.3	22 55.0	21 07.0	- 5 34.0	+0.0361	0.5680	0.1808	+33	-43
177 B. Libræ	6.2	1.51	12.2	22 55.8	21 45.4	- 4 57.0	-0.0669	0.5682	0.1792	+28	-49
42 Libræ	5.0	+1.51	-12.1	-23 35.9	22 07.8	- 4 35.5	+0.5474	0.5684	-0.1783	+60	-15
A Scorpii	4.6	1.49	11.5	25 07.6	6 03 34.5	+ 0 38.8	+1.1736	0.5700	0.1644	+65	+29
31 B. Scorpii	5.4	1.49	11.7	24 19.9	03 42.0	+ 0 46.1	+0.3430	0.5701	0.1641	+47	-26
32 B. Scorpii	5.3	1.48	11.8	23 46.6	03 43.2	+ 0 47.3	-0.2273	0.5701	0.1641	+18	-58
3 Scorpii	5.9	1.49	11.5	25 02.6	04 00.1	+ 1 03.6	+1.0202	0.5702	0.1633	+65	+15
40 B. Scorpii	5.4	+1.48	-11.6	-24 38.2	05 36.4	+ 2 36.1	+0.3463	0.5706	-0.1591	+47	-26
48 B. Scorpii	4.9	1.47	11.2	25 40.6	07 32.2	+ 4 27.5	+1.1099	0.5711	0.1540	+65	+23
50 B. Scorpii	6.4	1.47	11.5	24 32.4	07 46.8	+ 4 41.6	-0.0911	0.5712	0.1534	+24	-50
24 G. Scorpii	6.2	+1.46	-11.5	-24 16.9	09 23.4	+ 6 14.5	-0.5997	0.5716	-0.1491	- 2	-87

Full Moon—Apr. 24 20^h 05^m.5

ELEMENTS OF OCCULTATIONS, 1931.

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APRIL.

THE STAR'S					AT CONJUNCTION IN R.A.					Limiting Parallels.	
Name.	Mag.	Reductions from 1931.0.		Apparent Declina- tion.	Greenwich Mean Time.	Hour Angle, H	Y	x'	y'	N.	S.
		$\Delta\alpha$	$\Delta\delta$								
41 G. Scorpii	6.3	+1.44	-11.4	-24 15.0	d h m	+ h m	-0.9825	0.5721	-0.1426	-26	-90
85 B. Scorpii	6.0	1.44	11.1	25 18.4	6 11 46.8	+ 8 32.4	+0.0380	0.5722	0.1414	+29	-43
σ Scorpii	3.0	1.43	11.0	25 25.9	12 13.6	+ 8 58.2	+0.1840	0.5727	0.1344	+17	-56
α Sco. (Antares)	1.3	1.41	10.6	26 17.0	14 46.5	+11 25.2	-9 23.8	+0.2638	0.5733	0.1251	+39
16 B. Scorpii	6.2	1.41	10.5	26 23.5	18 05.1	- 8 38.0	+0.2771	0.5734	0.1229	+40	-29
34 B. Scorpii	6.4	+1.38	-10.0	-27 19.9	18 52.8	- 3 38.7	+0.6502	0.5740	-0.1081	+61	- 8
95 G. Ophiuchi	6.1	1.30	9.2	27 40.8	7 00 04.1	+ 7 13.2	-0.0199	0.5742	0.0751	+20	-46
43 Ophiuchi	5.4	1.26	8.8	28 04.8	11 22.2	+ 7 13.2	+0.0963	0.5739	0.0621	+25	-39
63 G. Ophiuchi	6.3	1.19	8.4	27 51.3	15 45.8	+11 26.6	-0.5448	0.5726	0.0382	-10	-83
X Sagitt. (var.)	4.4	1.17	8.3	27 48.5	23 48.3	- 4 49.6	-0.6559	0.5722	0.0331	-17	-90
10 G. Sagittarii	5.7	+1.14	- 7.9	-28 03.4	8 01 31.8	- 3 09.9	-0.4969	0.5712	-0.0222	- 9	-79
10 B. Scorpii	5.8	1.14	7.6	28 45.3	05 13.7	+ 0 23.5	+0.2233	0.5710	0.0199	+28	-32
W Sagitt. (var.)	4.3	1.12	7.2	29 35.2	06 00.9	+ 1 08.8	+0.0628	0.5702	0.0123	+61	+22
38 B. Sagittarii	4.7	1.10	7.5	28 28.1	08 35.6	+ 3 37.6	-0.1346	0.5698	0.0086	+ 8	-53
D.-28° 14268	6.4	1.09	7.2	28 55.2	09 51.5	+ 4 50.6	+0.3343	0.5692	-0.0040	+33	-26
48 G. Sagittarii	6.3	+1.07	- 7.3	-28 18.9	11 26.4	+ 6 21.9	-0.3094	0.5684	+0.0025	- 1	-64
62 B. Sagittarii	6.0	1.07	7.1	28 40.7	13 40.0	+ 8 30.4	+0.0766	0.5684	0.0025	+18	-40
58 G. Sagittarii	6.1	1.05	7.1	28 27.9	13 40.2	+ 8 30.5	-0.1405	0.5676	0.0079	+ 8	-53
40 B. Sagittarii	6.3	0.93	5.8	29 27.8	15 33.7	+10 19.8	+1.2598	0.5614	0.0437	+61	+50
τ Sagittarii	3.5	0.85	6.1	27 46.5	9 04 16.2	- 1 26.3	-0.2356	0.5578	0.0601	+ 8	-59
83 B. Sagittarii	6.2	+0.86	- 5.6	-28 44.8	10 21.3	+ 4 25.5	-0.8228	0.5577	+0.0607	+62	+ 3
34 B. Sagittarii	5.9	0.77	5.4	28 00.1	10 35.1	+ 4 38.7	+0.5367	0.5531	0.0796	+51	-14
48 B. Sagittarii	5.7	0.74	5.6	27 07.8	17 53.4	+11 41.3	-0.0319	0.5515	0.0855	+12	-58
ω Sagittarii	4.8	0.62	5.0	26 29.1	20 14.1	-10 03.1	+0.2324	0.5434	0.1130	+37	-32
b Sagittarii	4.6	0.62	4.7	27 21.3	10 07 43.2	+ 1 01.9	+1.2346	0.5431	0.1141	+63	+39
A Sagittarii	4.9	+0.60	- 5.0	-26 23.1	08 12.8	+ 1 30.5	+0.2850	0.5424	+0.1162	+40	-29
40 B. Capricorni	6.2	0.44	4.4	25 10.8	09 07.8	+ 2 23.5	+0.5307	0.5307	0.1494	+65	+18
56 B. Capricorni	6.3	0.40	4.4	24 01.7	11 00 46.4	+ 6 29.3	-0.3257	0.5281	0.1560	+46	-27
χ Capricorni	5.3	0.24	4.6	21 28.4	04 14.1	- 3 08.3	-0.1528	0.5181	0.1805	+25	-54
27 Capricorni	6.1	0.24	4.7	20 50.1	18 02.7	+10 14.1	-0.7655	0.5177	0.1813	- 7	-90
ϕ Capricorni	5.3	+0.21	- 4.5	-20 56.4	18 32.2	+10 42.7	-0.0941	0.5156	+0.1862	+29	-50
33 Capricorni	5.3	0.18	4.2	21 08.8	21 34.0	-10 21.2	+0.9466	0.5127	0.1928	+69	+ 8
28 B. Capricorni	6.5	0.14	4.5	19 27.0	12 01 51.1	- 6 12.0	-0.3451	0.5107	0.1972	+18	-65
37 Capricorni	5.7	0.12	4.1	20 23.6	04 49.6	- 3 18.8	+1.1899	0.5091	0.2007	+70	+27
ϵ Capricorni	4.7	0.11	4.2	19 46.6	07 18.3	+ 0 54.6	+0.7401	0.5084	0.2023	+71	- 5
κ Capricorni	4.8	+0.08	- 4.2	-19 11.0	08 27.2	+ 0 12.3	+0.6717	0.5066	+0.2062	+71	- 9
52 B. Capricorni	6.5	+0.03	4.6	17 10.2	11 20.0	+ 3 00.0	-0.7288	0.5041	0.2114	0	-90
29 Aquarii	6.5	-0.02	4.2	17 17.9	15 17.4	+ 6 50.4	+0.8025	0.5005	0.2192	+73	- 2
39 Aquarii	6.2	0.08	4.6	14 32.1	21 44.1	-10 54.1	-1.0690	0.4976	0.2252	-20	-90
50 Aquarii	5.9	0.13	4.4	13 52.9	13 03 05.6	- 5 41.7	-0.3082	0.4945	0.2318	+24	-62
32 B. Aquarii	6.2	-0.15	- 4.4	-13 16.2	09 36.1	+ 0 37.8	-0.2755	0.4931	+0.2347	+26	-60
70 Aquarii	6.1	0.24	4.3	10 55.3	12 38.7	+ 3 35.5	-0.4373	0.4890	0.2433	+19	-71
74 Aquarii	5.8	0.25	3.9	11 59.1	22 52.5	-10 27.6	+1.4212	0.4881	0.2453	+67	+54
χ Aquarii	5.3	0.36	4.0	8 06.3	14 01 38.9	+ 7 45.8	+0.4069	0.4846	0.2536	+67	-24
17 B. Aquarii	6.3	0.39	4.2	6 17.2	14 50.9	+ 5 04.8	-1.0558	0.4842	0.2547	-13	-90
30 Piscium	5.6	-0.49	- 3.7	- 3 08.8	17 02.2	+ 7 12.7	-0.5178	0.4824	+0.2607	+18	-76
14 Piscium	6.1	0.50	3.5	3 32.4	15 08 37.7	- 1 36.5	+0.6657	0.4823	0.2614	+84	-11
30 B. Piscium	6.3	0.55	- 3.4	- 0 53.2	11 29.4	+ 1 10.7	-0.4473	0.4823	0.2626	+23	-71
τ Arietis	5.1	0.76	+ 5.0	+20 54.0	18 27.8	+ 7 58.1	+0.7414	0.5324	0.1854	+90	+ 5
36 Arietis	6.1	0.76	5.5	22 34.1	20 02 49.3	-10 38.9	-0.4461	0.5350	0.1793	+21	-56
16 Tauri	5.4	-0.73	+ 6.4	+24 04.5	06 11.0	- 7 23.9	-0.7724	0.5409	+0.1649	+ 2	-66
17 Tauri	3.8	-0.72	+ 6.4	+23 54.0	13 42.4	- 0 07.5	-0.5772	0.5409	+0.1648	+13	-61

Last Quarter—Apr. 9^d 20^h 15^m.2New Moon—Apr. 18^d 00^h 59^m.7

APRIL.

THE STAR'S					AT CONJUNCTION IN R.A.					Limiting Parallels.	
Name.	Magn.	Reductions from 1931.0.		Apparent Declina- tion.	Greenwich Mean Time.	Hour Angle, H	Y	α'	γ'	N.	S.
		$\Delta\alpha$	$\Delta\delta$								
<i>q</i> Tauri	4.3	-0.73	+6.5	+24 15.2	20 13 53.3	+0 03.0	-0.9346	0.5410	+0.1645	-9	-66
20 Tauri	4.1	0.72	6.5	24 09.3	14 10.3	+0 19.4	-0.7816	0.5412	0.1640	+1	-66
21 Tauri	5.8	0.73	6.5	24 20.5	14 12.4	+0 21.4	-0.9772	0.5412	0.1639	-12	-66
22 Tauri	6.5	0.73	6.5	24 18.9	14 16.2	+0 25.1	-0.9382	0.5413	0.1638	-9	-66
23 Tauri	4.3	0.72	6.4	23 44.2	14 24.2	+0 32.9	-0.2929	0.5414	0.1635	+29	-46
η Tauri	2.9	-0.72	+6.5	+23 53.7	14 55.7	+1 03.3	-0.3778	0.5418	+0.1624	+24	-50
104 B. Tauri	5.5	0.70	6.4	23 12.7	15 19.7	+1 26.5	+0.4209	0.5421	0.1616	+71	-9
27 Tauri	3.7	0.71	6.6	23 50.7	15 41.4	+1 47.5	-0.2016	0.5424	0.1609	+34	-41
28 Tauri	5.2	0.71	6.6	23 55.7	15 42.0	+1 48.0	-0.2898	0.5424	0.1608	+29	-45
36 Tauri	5.6	0.65	7.1	23 55.2	22 30.7	+8 22.7	+0.7671	0.5476	0.1464	+90	+11
χ Tauri	5.3	-0.59	+8.0	+25 28.2	21 06 30.1	-7 54.8	+0.2021	0.5535	+0.1281	+57	-16
17 B. Aurigæ	6.0	0.46	9.4	27 47.2	19 23.2	+4 30.3	-0.8199	0.5623	0.0960	-3	-63
38 B. Aurigæ	6.5	0.39	9.6	27 36.2	22 00 21.1	+9 17.3	-0.1808	0.5652	0.0828	+35	-31
47 B. Aurigæ	6.0	0.37	9.8	27 56.9	02 28.4	+11 19.8	-0.3768	0.5665	0.0770	+24	-42
354 B. Tauri	6.4	0.30	10.0	27 53.5	07 07.0	-8 12.0	+0.0114	0.5689	0.0642	+45	-19
22 Aurigæ	6.4	-0.30	+10.3	+28 52.5	08 05.1	-7 16.1	-0.9694	0.5694	+0.0614	-14	-62
β Tauri	1.7	0.28	10.2	28 33.2	09 17.0	-6 07.0	-0.5568	0.5700	0.0581	+13	-51
107 B. Aurigæ	6.5	0.21	10.1	27 37.3	13 13.8	-2 19.2	+0.6359	0.5718	0.0468	+90	+14
116 B. Aurigæ	5.9	0.20	10.6	29 10.8	14 34.9	-1 01.2	-0.9498	0.5724	0.0429	-13	-61
406 B. Tauri	5.6	0.12	10.4	27 57.1	19 19.2	+3 32.2	+0.5166	0.5741	0.0290	+80	+9
136 Tauri	4.6	-0.10	+10.3	+27 36.0	20 16.6	+4 27.3	+0.9130	0.5745	+0.0262	+90	+32
154 B. Aurigæ	6.4	0.09	10.7	28 56.2	21 33.6	+5 41.3	-0.4626	0.5749	0.0224	+19	-42
415 B. Tauri	6.1	0.06	10.4	27 34.4	23 22.0	+7 25.5	+1.0071	0.5754	0.0170	+90	+39
183 B. Aurigæ	6.3	-0.02	11.0	29 31.4	28 01 29.5	+9 28.0	-1.0136	0.5760	+0.0107	-18	-61
κ Aurigæ	4.4	+0.04	10.9	29 31.7	05 05.8	-11 04.1	-0.9991	0.5769	-0.0002	-17	-61
211 B. Aurigæ	6.3	+0.08	+11.0	+29 34.6	07 25.0	-8 50.3	-1.0580	0.5773	-0.0072	-22	-61
49 Aurigæ	5.1	0.17	10.5	28 04.8	13 01.0	-3 27.5	+0.4224	0.5781	0.0242	+73	+5
53 Aurigæ	5.6	0.19	10.8	29 02.9	14 16.2	-2 15.2	-0.6220	0.5782	0.0280	+9	-54
54 Aurigæ	5.8	0.20	10.5	28 19.7	14 44.6	-1 47.9	+0.1166	0.5782	0.0294	+52	-11
28 Geminorum	5.5	0.24	10.7	29 02.7	16 48.2	+0 10.9	-0.6991	0.5783	0.0357	+5	-60
47 Geminorum	5.6	+0.41	+9.7	+26 58.4	24 03 25.1	+10 22.8	+0.9092	0.5779	-0.0677	+90	+28
53 Geminorum	5.9	0.45	10.0	28 01.3	05 13.4	-11 53.2	-0.3066	0.5776	0.0731	+27	-37
134 B. Geminorum	6.5	0.45	9.5	26 49.1	05 40.6	-11 27.1	+0.9099	0.5776	0.0744	+90	+28
59 Geminorum	5.7	0.51	9.7	27 46.5	08 39.4	-8 35.3	-0.3190	0.5770	0.0833	+27	-38
ι Geminorum	3.8	0.51	9.7	27 56.4	09 07.5	-8 08.3	-0.5283	0.5770	0.0846	+15	-51
δ^1 Geminorum	5.0	+0.54	+9.8	+28 15.9	10 33.7	-6 45.5	-0.9893	0.5767	-0.0889	-15	-62
δ^2 Geminorum	5.0	0.54	9.7	28 03.8	10 45.2	-6 34.3	-0.7971	0.5766	0.0894	-1	-62
ν Geminorum	4.3	0.58	9.2	27 03.2	13 12.6	-4 12.7	+0.0200	0.5761	0.0966	+46	-22
ϵ Geminorum	5.5	0.63	8.6	25 57.1	16 30.4	-1 02.5	+0.8238	0.5752	0.1061	+90	+20
ϕ Geminorum	4.9	0.70	8.7	26 56.9	20 16.3	+2 34.5	-0.6245	0.5741	0.1168	+10	-55
ω Cancri	6.1	+0.74	+8.0	+25 35.1	23 17.3	+5 28.5	+0.4158	0.5731	-0.1252	+71	-4
4 Cancri	6.2	0.74	7.9	25 17.0	23 37.0	+5 47.5	+0.6858	0.5730	0.1261	+90	+10
ψ Cancri	5.9	0.80	7.7	25 43.2	25 03 09.1	+9 11.5	-0.2275	0.5717	0.1358	+32	-35
λ Cancri	5.9	0.85	6.9	24 14.6	07 16.6	-10 50.5	+0.7071	0.5701	0.1468	+90	+5
28 Cancri	6.1	0.91	6.6	24 22.6	10 35.2	-7 39.4	+0.0690	0.5687	0.1554	+49	-25
ν^1 Cancri	5.7	+0.92	+6.5	+24 19.0	11 46.8	-6 30.5	-0.0567	0.5682	-0.1584	+42	-32
ν^2 Cancri	6.4	0.93	6.4	24 19.3	12 23.7	-5 55.0	-0.1603	0.5679	0.1600	+36	-37
ξ Cancri	5.2	1.14	4.2	22 19.6	26 03 35.1	+8 42.4	-0.8319	0.5607	0.1962	-1	-68
79 Cancri	6.1	1.15	4.2	22 16.7	04 00.2	+9 06.6	-0.8651	0.5606	0.1971	-4	-68
90 H ¹ Cancri	6.1	1.16	3.8	21 34.2	05 23.8	+10 27.1	-0.4205	0.5598	0.2001	+22	-56
57 B. Leonis	6.5	+1.30	+1.4	+19 10.9	18 40.2	-0 45.3	-0.8355	0.5534	-0.2269	-1	-71
107 B. Leonis	6.3	+1.37	-0.7	+16 05.7	27 03 58.0	+8 12.8	+0.0954	0.5491	-0.2430	+50	-34

First Quarter—Apr. 25^d 13^h 40^m.1

ELEMENTS OF OCCULTATIONS, 1931.

539

APRIL.

THE STAR'S					AT CONJUNCTION IN R.A.					Limiting Parallels.	
Name.	Mag.	Reductions from 1931-0.		Apparent Declina- tion.	Greenwich Mean Time.	Hour Angle, H	Y	α'	γ'	N.	S.
		$\Delta\alpha$	$\Delta\delta$								
η Leonis	3.6	+1.39	-0.4	+17 06.0	^d 27 ^h 04 ^m 41.0	+ 8 54.3	-1.0919	0.5488	-0.2442	-17	0
37 Leonis	5.5	1.40	1.9	14 04.4	08 50.7	-11 04.7	+0.9245	0.5470	0.2506	+90	+9
42 Leonis	6.1	1.44	1.8	15 19.4	11 08.2	- 8 52.1	-0.9108	0.5461	0.2540	- 4	-75
1 Leonis	5.2	1.51	4.6	10 54.6	23 29.6	+ 3 03.9	+0.2761	0.5418	0.2697	+60	-27
308 B. Leonis	5.8	1.58	6.6	8 26.2	28 10 48.0	-10 00.7	-0.3680	0.5389	0.2806	+26	-63
σ Leonis	4.2	+1.58	-7.5	+ 6 24.3	14 04.3	- 6 51.0	+0.7344	0.5383	-0.2831	+90	- 6
β Virginis	3.8	1.67	10.0	2 09.1	29 03 40.7	+ 6 18.2	+1.0592	0.5370	0.2903	+90	+13
27 B. Virginis	6.5	1.67	10.5	+ 0 54.7	07 34.3	+10 03.9	+1.1570	0.5369	0.2915	+90	+20
13 Virginis	5.9	1.72	11.6	- 0 24.4	16 37.9	- 5 10.6	-0.1815	0.5374	0.2925	+36	-55
η Virginis	4.0	1.73	11.6	0 17.2	17 12.3	- 4 37.3	-0.4685	0.5375	0.2925	+22	-72
g Virginis	5.6	+1.81	-14.4	- 8 37.2	30 15 27.7	- 7 06.9	+1.3477	0.5424	-0.2847	+82	+38
α Virg. (<i>Spica</i>)	1.2	+1.84	-15.0	-10 48.3	22 57.9	+ 0 08.0	+1.4043	0.5451	-0.2789	+72	+49

MAY.

h Virginis	5.4	+1.87	-15.0	- 9 48.8	1 02 27.1	+ 3 29.9	-0.5471	0.5465	-0.2755	+15	-78
86 Virginis	5.6	1.89	15.3	12 05.1	08 12.5	+ 9 03.3	+0.1423	0.5490	0.2693	+49	-37
621 B. Virginis	6.4	1.92	15.6	14 38.7	16 19.8	- 7 06.3	+0.5453	0.5529	0.2588	+70	-16
40 H. Virginis	5.1	1.94	15.7	15 58.9	19 06.2	- 4 25.9	+1.1660	0.5542	0.2548	+75	+22
64 G. Libræ	5.8	2.06	14.9	22 09.0	2 22 47.2	- 1 45.7	+0.9785	0.5687	0.2025	+68	+11
169 B. Libræ	6.0	+2.08	-14.4	-22 55.1	8 07 32.7	+ 6 39.9	+0.0734	0.5729	-0.1816	+35	-41
177 B. Libræ	6.2	2.08	14.4	22 55.8	08 10.7	+ 7 16.4	-0.0287	0.5731	0.1800	+29	-46
42 Libræ	5.0	2.08	14.3	23 35.9	08 32.7	+ 7 37.6	+0.5831	0.5733	0.1791	+62	-13
λ Scorpii	4.6	2.10	13.7	25 07.6	13 54.9	-11 12.6	+1.2087	0.5755	0.1653	+65	+33
31 B. Scorpii	5.4	2.10	13.8	24 20.0	14 02.3	-11 05.4	+0.3828	0.5756	0.1650	+49	-24
32 B. Scorpii	5.3	+2.09	-13.9	-23 46.6	14 03.5	-11 04.4	-0.1844	0.5756	-0.1650	+20	-56
3 Scorpii	5.9	2.10	13.7	25 02.7	14 20.2	-10 48.2	+1.0564	0.5757	0.1642	+65	+18
40 B. Scorpii	5.4	2.10	13.6	24 38.2	15 55.0	- 9 17.2	+0.3871	0.5763	0.1600	+50	-24
48 B. Scorpii	4.9	2.11	13.4	25 40.7	17 49.0	- 7 27.6	+1.1472	0.5770	0.1550	+65	+27
50 B. Scorpii	6.4	2.10	13.5	24 32.5	18 03.4	- 7 13.7	-0.0464	0.5771	0.1543	+26	-47
24 G. Scorpii	6.2	+2.10	-13.4	-24 17.0	19 38.4	- 5 42.5	-0.5507	0.5777	-0.1500	0	-82
41 G. Scorpii	6.3	2.10	13.2	24 15.0	21 59.4	- 3 26.8	-0.9294	0.5785	0.1435	-22	-90
85 B. Scorpii	6.0	2.11	13.0	25 18.4	22 25.8	- 3 01.5	+0.0846	0.5786	0.1423	+31	-40
σ Scorpii	3.0	2.11	12.8	25 25.9	4 00 55.9	- 0 37.3	-0.1343	0.5793	0.1353	+19	-53
α Sco. (<i>Antares</i>)	1.3	2.12	12.3	26 17.0	04 10.9	+ 2 30.1	+0.3122	0.5802	0.1260	+42	-27
116 B. Scorpii	6.2	+2.12	-12.3	-26 23.5	04 57.8	+ 3 15.0	+0.3259	0.5803	-0.1237	+42	-27
134 B. Scorpii	6.4	2.12	11.6	27 19.9	10 03.0	+ 8 08.4	+0.6987	0.5813	0.1088	+63	- 5
95 G. Ophiuchi	6.1	2.10	10.3	27 40.9	21 06.7	- 5 14.2	+0.0406	0.5822	0.0755	+23	-42
43 Ophiuchi	5.4	2.08	9.7	28 04.8	5 01 24.4	- 1 06.7	+0.1582	0.5820	0.0624	+28	-36
163 G. Ophiuchi	6.3	2.04	8.8	27 51.3	09 15.7	+ 6 25.8	-0.4722	0.5808	0.0382	- 6	-76
X Sagitt. (<i>var.</i>)	4.4	+2.03	-8.6	-27 48.5	10 56.8	+ 8 03.0	-0.5812	0.5805	-0.0331	-13	-87
10 G. Sagittarii	5.7	2.02	8.1	28 03.5	14 33.5	+11 31.1	-0.4218	0.5795	0.0220	- 5	-73
210 B. Scorpii	5.8	2.02	7.8	28 45.3	15 19.6	-11 44.6	+0.2914	0.5793	0.0196	+32	-28
W Sagitt. (<i>var.</i>)	4.3	2.02	7.3	29 35.2	17 50.6	- 9 19.5	+1.1234	0.5784	0.0120	+61	+28
38 B. Sagittarii	4.7	2.00	7.4	28 28.1	19 04.6	- 8 08.3	-0.0607	0.5780	0.0082	+12	-48
C.D.-28° 14268	6.4	+1.99	-7.1	-28 55.2	20 37.2	- 6 39.4	+0.4040	0.5774	-0.0036	+37	-22
48 G. Sagittarii	6.3	1.97	7.1	28 18.9	22 47.7	- 4 34.1	-0.2318	0.5766	+0.0030	+ 2	-59
62 B. Sagittarii	6.0	1.98	6.9	28 40.7	22 47.9	- 4 33.9	+0.1501	0.5766	0.0030	+22	-36
58 G. Sagittarii	6.1	1.96	6.7	28 27.9	6 00 38.6	- 2 47.4	-0.0638	0.5758	0.0085	+12	-49
γ Sagittarii	3.5	1.79	4.6	27 46.5	18 59.7	- 9 08.4	-0.1488	0.5654	0.0613	+12	-54
183 B. Sagittarii	6.2	+1.81	-4.2	-28 44.8	19 13.1	- 8 55.3	+0.8986	0.5652	+0.0619	+62	+ 9

Full Moon—May 2^d 05^h 14^m.4

MAY.

THE STAR'S					AT CONJUNCTION IN R.A.					Limiting Parallels.	
Name.	Mag.	Reductions from 1931 ^o .		Apparent Declina- tion.	Greenwich Mean Time.	Hour Angle, H	Y	x'	y'	N.	S.
		Δα	Δδ								
234 B. Sagittarii	5.9	+1.73	-3.5	-28 00.1	7 ^d 02 ^h 21 ^m	-2 02.6	+0.6188	0.5601	+0.0810	+57	-10
248 B. Sagittarii	5.7	1.69	3.5	27 07.7	04 39.2	+0 09.9	-0.1210	0.5584	0.0869	+16	-52
w Sagittarii	4.8	1.57	2.3	26 29.1	15 54.0	+11 00.5	+0.3234	0.5495	0.1145	+42	-27
A Sagittarii	4.9	1.55	2.2	26 23.1	17 16.8	-11 39.7	+0.3761	0.5483	0.1178	+45	-24
40 B. Capricorni	6.2	1.37	0.9	25 10.7	8 08 38.3	+3 10.4	+1.1470	0.5354	0.1508	+65	+26
56 B. Capricorni	6.3	+1.33	-0.7	-24 01.6	12 02.7	+6 28.0	+0.4231	0.5326	+0.1575	+52	-22
χ Capricorni	5.3	1.13	0.4	21 28.3	9 01 39.4	-4 21.5	-0.0482	0.5213	0.1817	+30	-47
27 Capricorni	6.1	1.12	0.6	20 50.1	02 08.6	-3 53.3	-0.6564	0.5209	0.1825	-1	-90
φ Capricorni	5.3	1.09	-0.2	20 56.4	05 08.0	-0 59.5	+0.0107	0.5186	0.1873	+34	-44
33 Capricorni	5.3	1.04	+0.2	21 08.8	09 22.2	+3 06.7	+1.0449	0.5153	0.1938	+69	+15
128 B. Capricorni	6.5	+0.99	-0.1	-19 27.0	12 18.8	+5 58.1	-0.2378	0.5131	+0.1981	+23	-58
37 Capricorni	5.7	0.98	+0.5	20 23.6	14 46.0	+8 20.8	+1.2878	0.5113	0.2015	+70	+37
ε Capricorni	4.7	0.96	0.4	19 46.6	15 54.2	+9 27.0	+0.8410	0.5104	0.2031	+71	+1
κ Capricorni	4.8	0.92	+0.4	19 10.9	18 45.3	-11 47.0	+0.7734	0.5084	0.2069	+71	-3
152 B. Capricorni	6.5	0.86	0.0	17 10.1	22 40.8	-7 58.6	-0.6190	0.5057	0.2119	+6	-86
29 Aquarii	6.5	+0.80	+0.6	-17 17.8	10 05 04.6	-1 45.9	+0.9041	0.5016	+0.2195	+73	+4
39 Aquarii	6.2	0.71	0.1	14 32.1	10 24.0	+3 24.3	-0.9587	0.4984	0.2253	-12	-90
45 Aquarii	6.1	0.67	0.1	13 39.1	13 56.2	+6 50.5	-1.1313	0.4964	0.2289	-23	-90
50 Aquarii	5.9	0.64	0.4	13 52.8	16 52.5	+9 41.9	-0.2023	0.4948	0.2317	+30	-56
182 B. Aquarii	6.2	0.61	0.4	13 16.2	19 54.4	-11 21.3	-0.1704	0.4933	0.2345	+31	-54
70 Aquarii	6.1	+0.49	+0.4	-10 55.2	11 06 06.2	-1 26.4	-0.3343	0.4888	+0.2427	+24	-64
h Aquarii	5.4	0.38	0.2	8 04.0	15 26.2	+7 38.3	-1.1988	0.4856	0.2490	-25	-90
χ Aquarii	5.3	0.32	0.7	8 06.2	22 03.2	-9 55.3	+0.5014	0.4838	0.2526	+73	-19
317 B. Aquarii	6.3	0.28	0.3	6 17.1	12 00 14.4	-7 47.5	-0.9586	0.4833	0.2537	-7	-90
337 B. Aquarii	6.4	0.23	0.2	4 54.5	05 16.7	-2 53.2	-1.1993	0.4824	0.2559	-23	-90
20 Piscium	5.6	+0.13	+0.5	-3 08.7	15 49.8	+7 23.2	-0.4312	0.4813	+0.2595	+22	-70
24 Piscium	6.1	0.12	0.8	3 32.3	18 41.6	+10 10.5	+0.7481	0.4812	0.2602	+87	-6
80 B. Piscium	6.3	+0.04	0.5	-0 53.2	13 01 40.1	-7 01.9	-0.3679	0.4813	0.2614	+25	-66
98 B. Piscium	6.3	-0.03	0.5	+1 18.3	08 58.2	+0 04.6	-0.8793	0.4820	0.2619	-1	-89
44 Piscium	6.1	0.07	0.7	1 33.5	13 19.7	+4 19.2	-0.0160	0.4827	0.2619	+44	-45
147 B. Piscium	5.9	-0.16	+0.4	+4 55.6	14 02 20.8	-7 00.5	-0.3299	0.4858	+0.2602	+28	-62
171 B. Piscium	6.3	0.23	1.1	6 06.7	08 48.6	-0 43.0	+0.0420	0.4880	0.2584	+47	-42
ε Piscium	4.4	0.26	0.9	7 31.2	10 33.1	+0 58.5	-1.0567	0.4887	0.2578	-12	-83
URANUS	6.2	..	..	6 15.7	13 49.0	+4 09.2	+1.1649	0.4880	0.2557	+90	+21
ζ Piscium	5.3	0.28	1.4	7 12.7	16 32.2	+6 47.9	+0.8181	0.4912	0.2554	+90	0
π Piscium	5.6	-0.39	+1.6	+11 47.4	15 05 16.9	-4 48.6	-0.9871	0.4977	+0.2482	-8	-79
107 B. Aurigæ	6.5	0.34	9.0	27 37.3	19 19 06.0	+5 20.3	+0.5370	0.5770	0.0461	+82	+9
116 B. Aurigæ	5.9	0.34	9.4	29 10.8	20 26.0	+6 37.3	-1.0424	0.5775	0.0422	-20	-61
406 B. Tauri	5.6	0.28	9.4	27 57.1	20 01 06.6	+11 07.0	+0.4125	0.5792	0.0282	+72	+4
136 Tauri	4.6	0.27	9.3	27 36.0	02 03.3	-11 58.6	+0.8063	0.5795	0.0254	+90	+25
154 B. Aurigæ	6.4	-0.26	+9.6	+28 56.2	03 19.4	-10 45.5	-0.5644	0.5799	+0.0216	+13	-49
415 B. Tauri	6.1	0.23	9.4	27 34.4	05 06.5	-9 02.6	+0.8972	0.5804	0.0162	+90	+31
183 B. Aurigæ	6.3	0.22	9.8	29 31.3	07 12.5	-7 01.5	-1.1170	0.5808	+0.0098	-28	-61
κ Aurigæ	4.4	0.18	9.8	29 31.7	10 46.5	-3 36.0	-1.1060	0.5815	-0.0012	-26	-61
49 Aurigæ	5.1	0.07	9.7	28 04.8	18 36.8	+3 55.8	+0.3030	0.5822	0.0253	+64	-1
53 Aurigæ	5.6	-0.06	+9.9	+29 02.9	19 51.3	+5 07.4	-0.7392	0.5823	-0.0291	+2	-61
54 Aurigæ	5.8	0.05	9.8	28 19.7	20 19.5	+5 34.4	-0.0033	0.5822	0.0305	+45	-17
28 Geminorum	5.5	-0.02	10.0	29 02.7	22 22.1	+7 32.2	-0.8184	0.5822	0.0368	-3	-61
47 Geminorum	5.6	+0.12	9.3	26 58.4	21 08 54.4	-6 20.5	+0.7774	0.5809	0.0688	+90	+20
53 Geminorum	5.9	0.15	9.6	28 01.3	10 42.2	-4 37.0	-0.4380	0.5805	0.0742	+20	-45
134 B. Geminorum	6.5	+0.16	+9.2	+26 49.1	11 09.2	-4 11.1	+0.7766	0.5804	-0.0756	+90	+20
59 Geminorum	5.7	+0.20	+9.4	+27 46.5	14 07.2	-1 20.1	-0.4533	0.5796	-0.0844	+19	-46

Last Quarter—May 9^d 12^h 48^m.2New Moon—May 17^d 15^h 27^m.9

ELEMENTS OF OCCULTATIONS, 1931.

541

MAY.

THE STAR'S					AT CONJUNCTION IN R.A.					Limiting Parallels.	
Name.	Mag.	Reductions from 1931.0.		Apparent Declina- tion.	Greenwich Mean Time.	Hour Angle, H	Y	x'	y'	N.	S.
		Δα	Δδ								
<i>t</i> Geminorum	3.8	+0.20	+9.4	+27 56.4	21 14 35.2	-0 53.1	-0.6627	0.5795	-0.0857	+7	-59
<i>b</i> ¹ Geminorum	5.0	0.22	9.5	28 15.9	16 01.1	+0 29.4	-1.1247	0.5790	0.0900	-27	-62
<i>b</i> ² Geminorum	5.0	0.23	9.4	28 03.8	16 12.5	+0 40.4	-0.9328	0.5790	0.0905	-11	-62
<i>v</i> Geminorum	4.3	0.26	9.1	27 03.2	18 39.4	+3 01.5	-0.1182	0.5782	0.0976	+38	-29
<i>c</i> Geminorum	5.5	0.30	8.7	25 57.1	21 56.8	+6 11.2	+0.6832	0.5770	0.1071	+90	+11
ϕ Geminorum	4.9	+0.36	+8.8	+26 56.9	22 01 42.4	+9 48.1	-0.7683	0.5755	-0.1177	+1	-64
ω Cancri	6.1	0.40	8.3	25 35.1	04 43.4	-11 18.0	+0.2706	0.5742	0.1260	+61	-12
4 Cancri	6.2	0.40	8.2	25 17.0	05 03.1	-10 59.0	+0.5407	0.5740	0.1269	+82	+2
ψ Cancri	5.9	0.46	8.0	25 43.2	08 35.4	-7 34.8	-0.3761	0.5723	0.1364	+24	-46
λ Cancri	5.9	0.51	7.4	24 14.6	12 43.6	-3 36.1	+0.5576	0.5702	0.1473	+83	+1
28 Cancri	6.1	+0.56	+7.2	+24 22.6	16 02.9	-0 24.3	-0.0840	0.5684	-0.1558	+40	-32
<i>v</i> ¹ Cancri	5.7	0.57	7.1	24 19.0	17 14.9	+0 44.9	-0.2106	0.5678	0.1588	+33	-40
<i>v</i> ² Cancri	6.4	0.58	7.1	24 19.4	17 51.9	+1 20.5	-0.3150	0.5674	0.1603	+28	-46
ξ Cancri	5.2	0.78	5.3	22 19.6	23 09 10.3	-7 55.0	-0.9983	0.5585	0.1956	-13	-68
79 Cancri	6.1	0.79	5.2	22 16.7	09 35.7	-7 30.5	-1.0319	0.5582	0.1965	-15	-68
90 H ¹ Cancri	6.1	+0.80	+4.9	+21 34.2	11 00.2	-6 09.1	-0.5855	0.5574	-0.1995	+13	-65
57 B. Leonis	6.5	0.96	2.8	19 10.9	24 00 27.4	+6 49.4	-1.0086	0.5494	-0.2553	-12	-71
107 B. Leonis	6.3	1.04	0.8	16 05.7	09 55.0	-8 02.9	-0.0717	0.5441	0.2407	+41	-42
η Leonis	3.6	1.06	+1.1	17 06.0	10 38.9	-7 20.5	-1.2699	0.5438	0.2418	-33	-73
37 Leonis	5.5	1.08	-0.3	14 04.4	14 53.5	-3 14.5	+0.7655	0.5416	0.2479	+90	-1
42 Leonis	6.1	+1.12	-0.1	+15 19.4	17 13.9	-0 59.0	-1.0877	0.5405	-0.2511	-16	-75
<i>l</i> Leonis	5.2	1.22	2.9	10 54.6	25 05 52.4	+11 14.1	+0.1141	0.5351	0.2659	+51	-35
χ Leonis	4.6	1.26	4.8	7 42.5	13 15.2	-5 37.7	+1.3622	0.5327	0.2727	+82	+42
308 B. Leonis	5.8	1.33	4.9	8 26.2	17 28.4	-1 32.8	-0.5325	0.5315	0.2760	+18	-73
σ Leonis	4.2	1.34	5.9	6 24.4	20 50.0	+1 42.3	+0.5860	0.5307	0.2784	+81	-14
β Virginis	3.8	+1.47	-8.7	+2 09.1	26 10 49.8	-8 45.1	+0.9268	0.5289	-0.2850	+90	+5
27 B. Virginis	6.5	1.48	9.3	+0 54.7	14 50.4	-4 52.4	+1.0299	0.5287	0.2860	+90	+11
13 Virginis	5.9	1.57	10.4	-0 24.4	27 00 10.2	+4 09.3	-0.3173	0.5292	0.2869	+28	-62
η Virginis	4.0	1.58	10.4	0 17.2	00 45.6	+4 43.6	-0.6077	0.5292	0.2868	+13	-83
319 B. Virginis	6.3	1.67	12.9	5 55.7	13 50.4	-6 37.0	+1.3286	0.5316	0.2841	+83	+35
<i>g</i> Virginis	5.6	+1.76	-14.2	-8 37.1	23 40.2	+2 53.5	+1.2647	0.5346	-0.2792	+82	+28
<i>a</i> Virg. (<i>Spica</i>)	1.2	1.83	15.0	10 48.3	28 07 22.8	+10 20.7	+1.3335	0.5376	0.2735	+79	+37
<i>h</i> Virginis	5.4	1.87	14.9	9 48.8	10 57.6	-10 11.7	-0.6376	0.5393	0.2703	+10	-86
86 Virginis	5.6	1.92	15.5	12 05.1	16 51.8	-4 29.4	+0.0706	0.5421	0.2643	+45	-41
621 B. Virginis	6.4	2.00	16.2	14 38.7	29 01 10.8	+3 32.6	+0.4924	0.5466	0.2542	+67	-19
40 H. Virginis	5.1	+2.03	-16.4	-15 58.9	04 01.0	+6 16.8	+1.1250	0.5482	-0.2503	+75	+19
64 G. Libræ	5.8	2.33	16.3	22 09.0	30 08 11.6	+9 26.7	+0.9822	0.5654	0.1995	+68	+11
169 B. Libræ	6.0	2.41	15.8	22 55.1	17 03.3	-6 01.5	+0.0860	0.5706	0.1791	+35	-40
177 B. Libræ	6.2	2.41	15.7	22 55.8	17 41.6	-5 24.6	-0.0156	0.5710	0.1776	+30	-46
42 Libræ	5.0	2.42	15.7	23 36.0	18 03.9	-5 03.2	+0.6005	0.5711	0.1767	+62	-12
<i>A</i> Scorpii	4.6	+2.49	-15.3	-25 07.6	23 28.9	+0 09.5	+1.2384	0.5740	-0.1631	+65	+37
31 B. Scorpii	5.4	2.48	15.3	24 20.0	23 36.4	+0 16.7	+0.4085	0.5741	0.1628	+51	-22
32 B. Scorpii	5.3	2.47	15.3	23 46.7	23 37.6	+0 17.7	-0.1615	0.5741	0.1627	+21	-54
3 Scorpii	5.9	2.49	15.3	25 02.7	23 54.4	+0 33.9	+1.0860	0.5742	0.1620	+65	+21
40 B. Scorpii	5.4	2.50	15.1	24 38.3	31 01 29.9	+2 05.8	+0.4160	0.5751	0.1579	+50	-22
48 B. Scorpii	4.9	+2.52	15.0	-25 40.7	03 24.7	+3 56.4	+1.1828	0.5760	-0.1529	+65	+31
50 B. Scorpii	6.4	2.51	14.9	24 32.5	03 39.1	+4 10.1	-0.0156	0.5761	0.1522	+27	-46
24 G. Scorpii	6.2	2.52	14.8	24 17.0	05 14.8	+5 42.0	-0.5194	0.5768	0.1480	+1	-79
41 G. Scorpii	6.3	2.53	14.5	24 15.1	07 36.6	+7 58.4	-0.8952	0.5779	0.1416	-20	-90
85 B. Scorpii	6.0	2.55	14.4	25 18.4	08 03.1	+8 23.8	+0.1234	0.5781	0.1404	+34	-38
σ Scorpii	3.0	+2.57	-14.2	-25 26.0	10 33.9	+10 48.7	-0.0919	0.5791	-0.1334	+22	-50
α Sco. (<i>Antares</i>)	1.3	+2.60	-13.8	-26 17.1	13 49.5	-10 03.2	+0.3614	0.5803	-0.1243	+44	-25

First Quarter—May 24^d 19^h 38^m.8

Full Moon—May 31^d 14^h 33^m.0

MAY.

THE STAR'S					AT CONJUNCTION IN R.A.					Limiting Parallels.	
Name.	Mag.	Reductions from 1931.0.		Apparent Declina- tion.	Greenwich Mean Time.	Hour Angle, <i>H</i>	<i>Y</i>	<i>z'</i>	<i>y'</i>	N.	S.
		$\Delta\alpha$	$\Delta\delta$								
116 B. Scorpii	6.2	+2.61	-13.7	-26 23.6	31 14 36.5	- 9 18.2	+0.3765	0.5806	-0.1220	+45	-24
134 B. Scorpii	6.4	+2.65	-13.0	-27 19.9	19 42.3	- 4 24.5	+0.7584	0.5821	-0.1073	+63	-1

JUNE.

95 G. Ophiuchi	6.1	+2.70	-11.4	-27 40.9	1 00 45.5	+ 6 12.6	+0.1172	0.5841	-0.0742	+27	-38
43 Ophiuchi	5.4	2.72	10.7	28 04.8	11 02.4	+10 19.2	+0.2415	0.5844	0.0610	+32	-31
163 G. Ophiuchi	6.3	2.72	9.4	27 51.3	18 51.4	- 6 10.4	-0.3758	0.5839	0.0369	- 1	-69
X Sagitt. (var.)	4.4	2.72	9.2	27 48.5	20 31.9	- 4 33.9	-0.4818	0.5837	0.0317	- 8	-77
10 G. Sagittarii	5.7	2.73	8.5	28 03.5	2 00 07.1	- 1 07.2	-0.3170	0.5831	0.0206	0	-65
210 B. Scorpii	5.8	+2.74	- 8.3	-28 45.3	00 52.8	- 0 23.3	+0.3959	0.5829	-0.0182	+38	-22
W Sagitt. (var.)	4.3	2.76	7.8	29 35.2	03 22.7	+ 2 00.6	+1.2297	0.5823	0.0106	+61	+43
38 B. Sagittarii	4.7	2.74	7.7	28 28.1	04 36.2	+ 3 11.2	+0.0502	0.5820	0.0068	+18	-42
C.D. -28° 14268	6.4	2.74	7.4	28 55.2	06 08.0	+ 4 39.4	+0.5161	0.5815	-0.0021	+44	-15
48 G. Sagittarii	6.3	2.73	7.1	28 18.9	08 17.2	+ 6 43.5	-0.1147	0.5807	+0.0045	+ 8	-52
62 B. Sagittarii	6.0	+2.74	- 7.0	-28 40.7	08 17.5	+ 6 43.8	+0.2661	0.5807	+0.0045	+29	-30
58 G. Sagittarii	6.1	2.73	6.7	28 27.9	10 07.2	+ 8 29.2	+0.0556	0.5801	0.0100	+18	-42
7 Sagittarii	3.5	2.64	3.6	27 46.4	3 04 16.0	+ 1 55.9	-0.0024	0.5705	0.0631	+19	-45
183 B. Sagittarii	6.2	2.66	3.3	28 44.7	04 29.3	+ 2 08.7	+1.0404	0.5704	0.0637	+62	+20
234 B. Sagittarii	5.9	2.60	2.2	28 00.1	11 32.3	+ 8 55.9	+0.7715	0.5654	0.0830	+62	0
248 B. Sagittarii	5.7	+2.57	- 2.0	-27 07.7	13 48.0	+11 06.6	+0.0387	0.5637	+0.0890	+24	-43
ω Sagittarii	4.8	2.48	-0.2	26 29.0	4 00 53.5	- 2 12.2	+0.4955	0.5549	0.1167	+52	-17
Δ Sagittarii	4.9	2.46	0.0	26 23.0	02 15.1	- 0 53.4	+0.5496	0.5537	0.1200	+55	-14
56 B. Capricorni	6.3	2.26	+ 2.6	24 01.6	20 45.1	- 7 01.7	+0.6187	0.5375	0.1598	+63	-11
χ Capricorni	5.3	2.06	3.5	21 28.3	5 10 10.8	+ 5 57.7	+0.1645	0.5257	0.1839	+41	-36
27 Capricorni	6.1	+2.04	+ 3.3	-20 50.0	10 39.6	+ 6 25.6	-0.4396	0.5253	+0.1847	+10	-72
φ Capricorni	5.3	2.01	3.8	20 56.3	13 36.8	+ 9 17.1	+0.2264	0.5228	0.1894	+45	-33
33 Capricorni	5.3	1.97	4.4	21 08.7	17 47.8	-10 39.8	+1.2586	0.5193	0.1958	+69	+35
128 B. Capricorni	6.5	1.91	4.3	19 26.9	20 42.3	- 7 50.7	-0.0144	0.5169	0.2001	+34	-46
ε Capricorni	4.7	1.88	4.8	19 46.5	6 00 15.3	- 4 24.2	+1.0615	0.5141	0.2050	+71	+16
κ Capricorni	4.8	+1.84	+ 5.0	-19 10.8	03 04.6	- 1 39.9	+0.9966	0.5119	+0.2088	+71	+11
152 B. Capricorni	6.5	1.77	4.8	17 10.0	06 57.5	+ 2 05.9	-0.3859	0.5090	0.2137	+18	-68
29 Aquarii	6.5	1.70	5.6	17 17.8	13 17.6	+ 8 14.9	+1.1340	0.5044	0.2211	+73	+20
39 Aquarii	6.2	1.61	5.2	14 32.0	18 34.2	-10 37.6	-0.7175	0.5009	0.2267	+ 2	-90
45 Aquarii	6.1	1.56	5.2	13 39.0	22 04.6	- 7 13.3	-0.8879	0.4987	0.2301	- 6	-90
50 Aquarii	5.9	+1.54	+ 5.6	-13 52.7	7 00 59.6	- 4 23.3	+0.0383	0.4969	+0.2328	+42	-43
182 B. Aquarii	6.2	1.50	5.7	13 16.1	04 00.2	- 1 27.8	+0.0711	0.4952	0.2354	+43	-41
70 Aquarii	6.1	1.36	5.9	10 55.1	14 08.3	+ 8 23.4	-0.0900	0.4900	0.2433	+37	-50
h Aquarii	5.4	1.24	5.7	8 03.9	23 25.8	- 6 34.3	-0.9520	0.4863	0.2491	- 8	-90
χ Aquarii	5.3	1.17	6.3	8 06.1	8 06 01.6	- 0 09.0	+0.7429	0.4841	0.2525	+82	- 7
317 B. Aquarii	6.3	+1.13	+ 5.8	- 6 17.0	08 12.6	+ 1 58.5	-0.7144	0.4835	+0.2535	+ 7	-90
337 B. Aquarii	6.4	1.07	5.6	4 54.4	13 14.3	+ 6 52.2	-0.9563	0.4823	0.2555	- 6	-90
342 B. Aquarii	6.5	1.06	5.6	4 27.8	14 22.6	+ 7 58.7	-1.1567	0.4821	0.2559	-20	-90
20 Piscium	5.6	0.96	5.9	3 08.6	23 47.1	- 6 51.7	-0.1947	0.4807	0.2585	+34	-55
24 Piscium	6.1	0.93	6.2	3 32.2	9 02 38.9	- 4 04.5	+0.9815	0.4805	0.2591	+87	+ 7
80 B. Piscium	6.3	+0.84	+ 5.8	- 0 53.1	09 37.8	+ 2 43.5	-0.1382	0.4804	+0.2601	+37	-52
98 B. Piscium	6.3	0.76	5.6	+ 1 18.4	16 56.5	+ 9 50.7	-0.6556	0.4808	0.2604	+11	-83
44 Piscium	6.1	0.72	5.8	1 33.6	21 18.6	- 9 54.1	+0.2031	0.4813	0.2602	+56	-34
147 B. Piscium	5.9	0.60	5.1	4 55.7	10 10 21.8	+ 2 48.2	-0.1255	0.4843	0.2582	+38	-51
171 B. Piscium	6.3	0.52	5.6	6 06.8	16 50.7	+ 9 06.7	+0.2378	0.4864	0.2563	+58	-32
ε Piscium	4.4	+0.49	+ 5.3	+ 7 31.2	18 35.4	+10 48.6	-0.8629	0.4871	+0.2557	0	-83
ζ Piscium	5.3	0.45	5.8	7 12.8	11 00 35.6	- 7 20.9	+1.0028	0.4896	0.2532	+90	+11
π Piscium	5.6	+0.31	+ 5.2	+11 47.4	13 22.2	+ 5 04.5	-0.8221	0.4962	+0.2460	+ 1	-79

Full Moon—May 31^d 14^h 33^m.0Last Quarter—June 8^d 06^h 18^m.2

ELEMENTS OF OCCULTATIONS, 1931.

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JUNE.

THE STAR'S					AT CONJUNCTION IN R.A.					Limiting Parallels.	
Name.	Mag.	Reductions from 1931.0.		Apparent Declina- tion.	Greenwich Mean Time.	Hour Angle, H	Y	x'	y'	N.	S.
		$\Delta\alpha$	$\Delta\delta$								
12 H ¹ Arietis	6.3	+0.21	+ 5.7	+13 08.8	12 02 53.8	- 5 47.2	+0.9568	0.5049	+0.2352	+90	+11
19 Arietis	5.8	0.17	5.5	14 57.5	08 18.3	- 0 32.2	+0.2428	0.5088	0.2300	+59	-26
27 Arietis	6.4	0.09	5.5	17 24.1	17 20.7	+ 8 13.8	-0.3707	0.5159	0.2198	+25	-57
36 Arietis	6.5	0.05	5.9	17 28.5	23 59.3	- 9 19.9	+0.9819	0.5215	0.2113	+90	+16
40 Arietis	6.0	+0.04	5.9	17 59.9	13 02 02.5	- 7 20.5	+0.8460	0.5232	0.2085	+90	+ 8
47 Arietis	5.8	0.00	+ 5.7	+20 23.7	06 37.6	- 2 54.0	-0.7942	0.5273	+0.2018	+ 2	-70
5 Arietis	4.8	-0.04	6.1	20 47.5	14 35.5	+ 4 48.4	+0.3375	0.5345	0.1890	+65	-16
7 Arietis	5.1	0.05	6.3	20 54.1	17 31.8	+ 7 38.9	+0.7669	0.5372	0.1839	+90	+ 7
66 Arietis	6.1	-0.08	6.1	22 34.1	20 49.9	+10 50.3	-0.4211	0.5402	+0.1778	+22	-54
c Geminorum	5.5	+0.23	8.1	25 57.1	18 04 24.3	- 9 33.8	+0.5309	0.5837	-0.1100	+81	+ 3
φ Geminorum	4.9	+0.27	+ 8.1	+26 56.9	08 05.7	- 6 01.2	-0.9147	0.5821	-0.1207	- 9	-64
ω Cancrī	6.1	0.30	7.8	25 35.1	11 03.4	- 3 10.5	+0.1100	0.5806	0.1291	+51	-21
4 Cancrī	6.2	0.30	7.7	25 17.0	11 22.7	- 2 51.9	+0.3773	0.5805	0.1300	+69	- 7
ψ Cancrī	5.9	0.33	7.5	25 43.2	14 51.2	+ 0 28.4	-0.5379	0.5786	0.1396	+15	-56
λ Cancrī	5.9	0.37	7.2	24 14.6	18 55.0	+ 4 22.8	+0.3812	0.5764	0.1504	+68	- 9
28 Cancrī	6.1	+0.41	+ 7.0	+24 22.6	22 10.9	+ 7 31.1	-0.2607	0.5745	-0.1589	+30	-42
ν ¹ Cancrī	5.7	0.42	6.9	24 19.0	23 21.6	+ 8 39.1	-0.3884	0.5738	0.1619	+24	-50
ν ² Cancrī	6.4	0.42	6.9	24 19.3	23 58.0	+ 9 14.1	-0.4929	0.5734	0.1635	+18	-56
ξ Cancrī	5.2	0.58	5.5	22 19.6	19 15 02.4	- 0 15.5	-1.1961	0.5634	0.1986	-29	-68
90 H ¹ Cancrī	6.1	0.59	5.2	21 34.2	16 50.8	+ 1 28.9	-0.7888	0.5622	0.2024	+ 2	-69
57 B. Leonis	6.5	+0.72	+ 3.5	+19 10.9	20 06 08.4	- 9 42.3	-1.2288	0.5530	-0.2277	-30	-71
107 B. Leonis	6.3	0.79	1.9	16 05.7	15 31.0	- 0 39.5	-0.3073	0.5469	0.2427	+29	-55
37 Leonis	5.5	0.83	+ 0.8	14 04.4	20 27.6	+ 4 07.0	+0.5225	0.5438	0.2497	+77	-14
l Leonis	5.2	0.96	- 1.5	10 54.6	21 11 23.3	- 5 27.5	-0.1383	0.5358	0.2666	+38	-48
x Leonis	4.6	1.00	3.2	7 42.5	18 46.2	+ 1 40.7	+1.1071	0.5326	0.2729	+90	+18
308 B. Leonis	5.8	+1.07	- 3.4	+ 8 26.2	23 00.0	+ 5 46.2	-0.7905	0.5310	-0.2759	+ 4	-82
σ Leonis	4.2	1.08	4.4	6 24.4	22 02 22.4	+ 9 02.1	+0.3290	0.5298	0.2779	+63	-27
β Virginis	3.8	1.23	7.1	2 09.1	16 27.5	- 1 20.0	+0.6731	0.5265	0.2834	+89	-10
27 B. Virginis	6.5	1.24	7.7	+ 0 54.7	20 30.3	+ 2 35.1	+0.7784	0.5260	0.2841	+90	- 4
13 Virginis	5.9	1.34	8.9	- 0 24.4	23 05 56.4	+11 43.1	-0.5704	0.5255	0.2842	+15	-80
γ Virginis	4.0	+1.35	- 8.9	- 0 17.2	06 32.3	-11 42.2	-0.8622	0.5256	-0.2842	- 1	-90
319 B. Virginis	6.3	1.46	11.7	5 55.7	19 48.7	+ 1 08.8	+1.0994	0.5268	0.2806	+85	+15
g Virginis	5.6	1.57	13.2	8 37.1	24 05 48.9	+10 49.6	+1.0482	0.5291	0.2751	+82	+12
a Virg. (Spica)	1.2	1.66	14.2	10 48.3	13 40.5	- 5 34.2	+1.1295	0.5317	0.2691	+80	+18
h Virginis	5.4	1.72	14.0	9 48.8	17 19.6	- 2 02.3	-0.8548	0.5332	0.2658	- 2	-90
86 Virginis	5.6	+1.79	-14.8	-12 05.1	23 21.2	+ 3 47.5	-0.1298	0.5358	-0.2596	+35	-52
621 B. Virginis	6.4	1.90	15.8	14 38.7	25 07 51.2	-11 59.5	+0.3116	0.5400	0.2494	+56	-29
40 H. Virginis	5.1	1.94	16.2	15 58.9	10 45.1	- 9 11.5	+0.9564	0.5415	0.2455	+75	+ 8
64 G. Libræ	5.8	2.36	17.0	22 09.0	26 15 33.7	- 5 23.5	+0.8719	0.5587	0.1951	+68	+ 4
169 B. Libræ	6.0	2.49	16.6	22 55.1	27 00 36.8	+ 3 19.7	-0.0137	0.5642	0.1750	+30	-46
177 B. Libræ	6.2	+2.50	-16.5	-22 55.8	01 15.9	+ 3 57.4	-0.1149	0.5646	-0.1734	+25	-51
42 Libræ	5.0	2.51	16.6	23 36.0	01 38.7	+ 4 19.4	+0.5084	0.5648	0.1725	+57	-17
A Scorpī	4.6	2.61	16.4	25 07.6	07 10.4	+ 9 38.7	+1.1650	0.5680	0.1592	+65	+28
31 B. Scorpī	5.4	2.60	16.2	24 20.0	07 18.0	+ 9 46.0	+0.3271	0.5680	0.1589	+46	-27
32 B. Scorpī	5.3	2.59	16.1	23 46.7	07 19.2	+ 9 47.1	-0.2486	0.5680	0.1589	+17	-60
3 Scorpī	5.9	+2.61	-16.3	-25 02.7	07 36.4	+10 03.6	+1.0120	0.5682	-0.1581	+65	+15
40 B. Scorpī	5.4	2.63	16.1	24 38.3	09 13.8	+11 37.4	+0.3390	0.5691	0.1541	+46	-26
48 B. Scorpī	4.9	2.67	16.1	25 40.7	11 10.8	-10 30.0	+1.1176	0.5701	0.1491	+65	+24
50 B. Scorpī	6.4	2.66	15.8	24 32.5	11 25.5	-10 15.8	-0.0920	0.5702	0.1485	+24	-50
24 G. Scorpī	6.2	2.67	15.6	24 17.0	13 03.0	- 8 42.1	-0.5968	0.5711	0.1443	- 3	-87
41 G. Scorpī	6.3	+2.70	-15.3	-24 15.1	15 27.5	- 6 23.1	-0.9706	0.5723	-0.1380	-25	-90
85 B. Scorpī	6.0	+2.72	-15.4	-25 18.4	15 54.5	- 5 57.1	+0.0586	0.5725	-0.1368	+29	-41

New Moon—June 16^d 03^h 03^m·7First Quarter—June 23^d 00^h 23^m·2

JUNE.

THE STAR'S					AT CONJUNCTION IN R.A.					Limiting Parallels.	
Name.	Mag.	Reductions from 1931.0.		Apparent Declina- tion.	Greenwich Mean Time.	Hour Angle, H	Y	z'	y'	N.	S.
		$\Delta\alpha$	$\Delta\delta$								
σ Scorpii	3.0	+2.76	-15.2	-25 26.0	27 18 28.1	- 3 29.3	-0.1528	0.5737	-0.1299	+19	-54
α Sco. (<i>Antares</i>)	1.3	2.81	14.9	26 17.1	21 47.3	- 0 17.7	+0.3122	0.5751	0.1209	+42	-27
116 B. Scorpii	6.2	2.82	14.8	26 23.6	22 35.1	+ 0 28.2	+0.3221	0.5754	0.1187	+43	-26
134 B. Scorpii	6.4	2.90	14.2	27 19.9	23 03 46.0	+ 5 27.1	+0.7259	0.5774	0.1041	+63	- 3
95 G. Ophiuchi	6.1	3.03	12.5	27 40.9	14 59.4	- 7 45.7	+0.1048	0.5803	0.0714	+26	-39
43 Ophiuchi	5.4	+3.08	-11.8	-28 04.9	19 19.7	- 3 35.7	+0.2399	0.5809	-0.0584	+32	-31
163 G. Ophiuchi	6.3	3.13	10.3	27 51.3	29 03 14.4	+ 4 00.4	-0.3634	0.5812	0.0344	- 1	-68
X Sagitt. (<i>var.</i>)	4.4	3.14	10.0	27 48.5	04 56.0	+ 5 38.0	-0.4662	0.5810	0.0293	- 7	-76
10 G. Sagittarii	5.7	3.18	9.2	28 03.5	08 33.4	+ 9 06.9	-0.2920	0.5807	0.0183	+ 1	-63
210 B. Scorpii	5.8	3.20	9.1	28 45.3	09 19.5	+ 9 51.2	+0.4265	0.5806	0.0159	+40	-21
38 B. Sagittarii	4.7	+3.21	- 8.4	-28 28.1	13 04.9	-10 32.3	+0.0874	0.5800	-0.0045	+19	-40
C. D.—28° 14268	6.4	3.23	8.1	28 55.2	14 37.4	- 9 03.2	+0.5590	0.5797	+0.0002	+47	-13
48 G. Sagittarii	6.3	3.23	7.7	28 18.9	16 47.8	- 6 58.0	-0.0699	0.5791	0.0067	+12	-49
62 B. Sagittarii	6.0	3.24	7.6	28 40.7	16 48.0	- 6 57.8	+0.3126	0.5791	0.0067	+32	-27
58 G. Sagittarii	6.1	3.24	7.2	28 27.9	18 38.5	- 5 11.6	+0.1053	0.5786	0.0123	+21	-39
τ Sagittarii	3.5	+3.26	- 3.5	-27 46.4	30 12 53.0	-11 39.2	+0.0879	0.5706	+0.0653	+25	-40
183 B. Sagittarii	6.2	3.29	3.3	28 44.7	13 06.3	-11 26.3	+1.1337	0.5705	0.0659	+62	+29
234 B. Sagittarii	5.9	3.26	1.8	28 00.0	20 10.3	- 4 38.3	+0.8793	0.5661	0.0852	+62	+ 7
248 B. Sagittarii	5.7	+3.24	- 1.4	-27 07.7	22 26.2	- 2 27.4	+0.1501	0.5645	+0.0912	+30	-36

JULY.

ω Sagittarii	4.8	+3.20	+ 0.9	-26 29.0	1 09 31.6	+ 8 13.8	+0.6315	0.5563	+0.1191	+60	- 9
A Sagittarii	4.9	3.18	1.2	26 23.0	10 53.2	+ 9 32.5	+0.6886	0.5553	0.1223	+63	- 6
56 B. Capricorni	6.3	3.05	4.7	24 01.6	2 05 20.1	+ 3 21.2	+0.7962	0.5399	0.1623	+66	0
X Capricorni	5.3	2.88	6.4	21 28.2	18 42.1	- 7 43.2	+0.3692	0.5284	0.1865	+52	-25
27 Capricorni	6.1	2.86	6.3	20 50.0	19 10.7	- 7 15.5	-0.2331	0.5280	0.1873	+22	-58
ϕ Capricorni	5.3	+2.84	+ 6.9	-20 56.2	22 07.0	- 4 24.9	+0.4376	0.5255	+0.1920	+57	-21
128 B. Capricorni	6.5	2.75	7.7	19 26.8	3 05 10.1	+ 2 25.0	+0.2107	0.5196	0.2027	+46	-33
ϵ Capricorni	4.7	2.73	8.4	19 46.4	08 41.8	+ 5 50.1	+1.2910	0.5168	0.2076	+71	+32
κ Capricorni	4.8	2.70	8.6	19 10.8	11 30.1	+ 8 33.4	+1.2311	0.5146	0.2113	+71	+31
152 B. Capricorni	6.5	2.62	8.7	17 09.9	15 21.7	-11 42.1	-0.1420	0.5116	0.2162	+30	-53
39 Aquarii	6.2	+2.47	+ 9.6	-14 31.9	4 02 54.3	- 0 29.8	-0.4544	0.5034	+0.2289	+16	-72
45 Aquarii	6.1	2.43	9.9	13 38.9	06 23.6	+ 2 53.5	-0.6193	0.5011	0.2323	+ 8	-83
50 Aquarii	5.9	2.40	10.3	13 52.6	09 17.7	+ 5 42.6	+0.3094	0.4993	0.2350	+56	-25
182 B. Aquarii	6.2	2.37	10.5	13 16.0	12 17.3	+ 8 37.1	+0.3463	0.4974	0.2376	+60	-27
70 Aquarii	6.1	2.24	11.0	10 55.0	22 22.6	- 5 34.4	+0.1980	0.4918	0.2451	+52	-34
h Aquarii	5.4	+2.12	+11.1	- 8 03.8	5 07 38.1	+ 3 25.9	-0.6536	0.4877	+0.2505	+ 9	-88
ϕ Aquarii	4.6	2.05	11.0	6 25.1	12 47.4	+ 8 26.8	-1.1721	0.4858	0.2530	-21	-96
X Aquarii	5.3	2.06	11.7	8 06.0	14 12.8	+ 9 49.9	+1.0456	0.4852	0.2536	+82	+11
317 B. Aquarii	6.3	2.01	11.3	6 16.9	16 23.4	+11 57.0	-0.4092	0.4845	0.2545	+23	-61
337 B. Aquarii	6.4	1.96	11.2	4 54.3	21 24.6	- 7 09.8	-0.6479	0.4831	0.2563	+11	-80
342 B. Aquarii	6.5	+1.94	+11.2	- 4 27.7	22 32.8	- 6 03.4	-0.8476	0.4828	+0.2566	0	-99
20 Piscium	5.6	1.84	11.6	3 08.5	6 07 57.0	+ 3 06.0	+0.1183	0.4809	0.2589	+50	-31
24 Piscium	6.1	1.82	12.0	3 32.1	10 48.8	+ 5 53.3	+1.2957	0.4806	0.2593	+87	+3
80 B. Piscium	6.3	1.73	11.6	- 0 53.0	17 48.2	-11 18.4	+0.1768	0.4800	0.2600	+53	-31
98 B. Piscium	6.3	1.64	11.4	+ 1 18.5	7 01 07.8	+ 4 10.3	-0.3415	0.4801	0.2599	+27	-6
44 Piscium	6.1	+1.60	+11.6	+ 1 33.6	05 30.7	+ 0 05.7	+0.5174	0.4804	+0.2595	+76	- 1
147 B. Piscium	5.9	1.48	10.6	4 55.8	18 37.2	-11 08.5	+0.1830	0.4826	0.2509	+55	-3
171 B. Piscium	6.3	1.39	11.1	6 06.9	8 01 08.2	- 4 48.0	+0.5429	0.4845	0.2547	+78	- 1
ϵ Piscium	4.4	1.37	10.7	7 31.3	02 53.6	- 3 05.4	-0.5620	0.4850	0.2540	+16	-7
ζ Piscium	5.3	1.33	11.1	7 12.8	08 56.1	+ 2 47.4	+1.3035	0.4873	0.2513	+90	+3
π Piscium	5.6	+1.18	+10.2	+11 47.5	21 48.4	- 8 41.6	-0.5407	0.4934	+0.2436	+17	-7

Full Moon—June 30^d 00^h 46^m.9Last Quarter—July 7^d 23^h 51^m.6

ELEMENTS OF OCCULTATIONS, 1931.

545

JULY.

THE STAR'S					AT CONJUNCTION IN R.A.					Limiting Parallels.	
Name.	Mag.	Reductions from 1931-0.		Apparent Declina- tion.	Greenwich Mean Time.	Hour Angle, H	Y	x'	y'	N.	S.
		$\Delta\alpha$	$\Delta\delta$								
12 H ¹ Arietis	6.3	+1.06	+10.3	+13 08.8	9 11 26.7	+ 4 33.6	+1.2251	0.5017	+0.2326	+90	+0
19 Arietis	5.8	1.02	9.9	14 57.6	16 54.0	+ 9 51.4	+0.5003	0.5056	0.2272	+76	-13
27 Arietis	6.4	0.93	9.3	17 24.1	10 02 01.1	- 5 17.9	-0.1306	0.5126	0.2170	+38	-44
36 Arietis	6.5	0.88	9.5	17 28.5	08 43.0	+ 1 11.7	+1.2139	0.5182	0.2084	+90	+34
40 Arietis	6.0	0.86	9.4	18 00.0	10 47.2	+ 3 12.2	+1.0736	0.5199	0.2056	+90	+23
47 Arietis	5.8	+0.82	+ 8.9	+20 23.7	15 24.5	+ 7 40.7	-0.5803	0.5240	+0.1989	+14	-66
4 Arietis	4.8	0.76	8.9	20 47.5	23 26.0	- 8 33.3	+0.5383	0.5314	0.1861	+80	- 5
7 Arietis	5.1	0.74	9.0	20 54.1	11 02 23.4	- 5 41.7	+0.9624	0.5341	0.1810	+90	+19
66 Arietis	6.1	0.71	8.6	22 34.2	05 42.8	- 2 28.9	-0.2350	0.5373	0.1751	+32	-44
16 Tauri	5.4	0.66	8.4	24 04.6	13 07.8	+ 4 41.1	-0.5980	0.5444	0.1608	+12	-62
17 Tauri	3.8	+0.66	+ 8.4	+23 54.0	13 09.9	+ 4 43.1	-0.4046	0.5444	+0.1608	+23	-51
9 Tauri	4.3	0.66	8.3	24 15.3	13 18.5	+ 4 51.5	-0.7598	0.5446	0.1605	+ 2	-66
20 Tauri	4.1	0.65	8.4	24 09.3	13 35.3	+ 5 07.6	-0.6096	0.5448	0.1599	+11	-62
21 Tauri	5.8	0.65	8.3	24 20.6	13 37.3	+ 5 09.5	-0.8036	0.5448	0.1598	0	-66
22 Tauri	6.5	0.65	8.3	24 19.0	13 41.1	+ 5 13.2	-0.7653	0.5449	0.1597	+ 2	-66
23 Tauri	4.3	+0.65	+ 8.5	+23 44.2	13 49.0	+ 5 20.9	-0.1261	0.5450	+0.1594	+38	-36
7 Tauri	2.9	0.65	8.4	23 53.7	14 20.0	+ 5 50.8	-0.2130	0.5455	0.1584	+33	-40
104 B. Tauri	5.5	0.65	8.6	23 12.8	14 43.5	+ 6 13.5	+0.5768	0.5459	0.1576	+84	0
27 Tauri	3.7	0.64	8.5	23 50.8	15 04.9	+ 6 34.1	+0.0423	0.5463	0.1568	+42	-31
28 Tauri	5.2	0.64	8.4	23 55.8	15 05.5	+ 6 34.7	-0.1298	0.5463	0.1568	+38	-36
36 Tauri	5.6	+0.60	+ 8.6	+23 55.2	21 46.8	-10 58.0	+0.8808	0.5526	+0.1425	+90	+19
8 Tauri	5.3	0.56	8.4	25 28.2	12 05 35.9	- 3 25.9	+0.2786	0.5600	0.1243	+62	-12
17 B. Aurigæ	6.0	0.49	8.0	27 47.1	18 09.3	+ 8 39.5	-0.7982	0.5708	0.0921	- 1	-63
38 B. Aurigæ	6.5	0.47	8.1	27 36.2	22 58.5	-10 42.3	-0.1935	0.5746	0.0787	+34	-32
47 B. Aurigæ	6.0	0.46	8.1	27 56.9	18 01 01.9	- 8 43.7	-0.3977	0.5761	0.0729	+22	-42
354 B. Tauri	6.4	+0.45	+ 8.1	+27 53.5	05 31.8	- 4 24.4	-0.0392	0.5793	+0.0599	+43	-22
22 Aurigæ	6.4	0.45	7.9	28 52.5	06 28.0	- 3 30.3	-1.0101	0.5799	0.0571	-17	-62
8 Tauri	1.7	0.45	7.9	28 33.2	07 37.5	- 2 23.5	-0.6099	0.5807	0.0537	+10	-54
107 B. Aurigæ	6.5	0.43	8.1	27 37.2	11 26.4	+ 1 16.4	+0.5439	0.5830	+0.0423	+83	+10
107 B. Leonis	6.3	0.69	2.1	16 05.7	17 22 34.6	+ 8 11.7	-0.4954	0.5543	-0.2479	+19	-65
34 Leonis	6.4	+0.69	+ 1.4	+13 41.8	18 01 11.2	+10 42.9	+1.2521	0.5525	-0.2517	+90	+35
37 Leonis	5.5	0.71	+ 1.3	14 04.4	03 24.0	-11 09.0	+0.3146	0.5511	0.2548	+63	-24
1 Leonis	5.2	0.80	- 0.7	10 54.6	17 58.9	+ 2 55.7	-0.3661	0.5425	0.2715	+26	-63
8 Leonis	4.6	0.81	2.1	7 42.5	19 01 12.1	+ 9 54.1	+0.8543	0.5389	0.2775	+90	+ 2
308 B. Leonis	5.8	0.88	2.3	8 26.3	05 20.5	-10 05.8	-1.0299	0.5370	0.2803	-10	-82
8 Leonis	4.2	+0.88	- 3.1	+ 6 24.4	08 38.8	- 6 54.1	+0.0738	0.5357	-0.2822	+49	-40
89 Leonis	5.7	0.90	4.6	3 26.5	14 49.6	- 0 55.6	+1.2911	0.5334	0.2849	+90	+32
Mars	1.6	..	..	3 44.4	15 22.3	- 0 23.9	+0.8387	0.5113	0.2750	+90	- 1
8 Virginis	3.8	1.00	5.7	2 09.1	22 28.2	+ 6 28.1	+0.3997	0.5313	0.2868	+68	-24
27 B. Virginis	6.5	1.00	6.2	+ 0 54.8	20 02 27.0	+10 19.1	+0.5011	0.5304	0.2872	+75	-19
13 Virginis	5.9	+1.10	- 7.4	- 0 24.3	11 44.9	- 4 41.2	-0.8442	0.5291	-0.2867	0	-90
7 Virginis	4.0	+1.10	7.4	0 17.1	12 20.3	- 4 06.9	-1.1344	0.5291	0.2866	-18	-90
319 B. Virginis	6.3	1.21	10.2	5 55.6	21 01 27.8	+ 8 35.2	+0.8131	0.5291	0.2819	+85	- 3
8 Virginis	5.6	1.31	11.7	8 37.1	11 23.5	- 5 48.4	+0.7647	0.5304	0.2756	+82	- 5
8 Virg. (Spica)	1.2	1.40	12.8	10 48.3	19 12.9	+ 1 45.7	+0.8501	0.5322	0.2690	+80	0
h Virginis	5.4	+1.46	-12.6	- 9 48.8	22 51.4	+ 5 17.0	-1.1293	0.5332	-0.2654	-21	-90
86 Virginis	5.6	1.53	13.6	12 05.1	22 04 52.6	+11 06.2	-0.4012	0.5352	0.2588	+21	-68
621 B. Virginis	6.4	1.64	14.7	14 38.7	13 23.1	- 4 40.3	+0.0481	0.5385	0.2480	+42	-42
214 G. Virginis	6.5	1.65	15.2	16 00.6	13 43.9	- 4 20.2	+1.3553	0.5386	0.2475	+73	+44
40 H. Virginis	5.1	1.69	15.2	15 58.9	16 17.6	- 1 51.7	+0.6968	0.5398	0.2439	+74	- 8
43 B. Libræ	5.7	+2.07	-17.8	-21 06.7	23 13 03.5	- 5 48.8	+1.2402	0.5501	-0.2089	+69	+33
47 G. Libræ	6.1	+2.10	-17.0	-21 46.1	17 00.8	- 1 59.8	+1.1080	0.5522	-0.2011	+69	+21

New Moon—July 15^d 12^h 20^m.0First Quarter—July 22^d 05^h 16^m.1

ELEMENTS OF OCCULTATIONS, 1931.

JULY.

THE STAR'S					AT CONJUNCTION IN R.A.					Limiting Parallels.	
Name.	Mag.	Reductions from 1931.0.		Apparent Declina- tion.	Greenwich Mean Time.	Hour Angle, H	Y	z	y'	N.	S.
		$\Delta\alpha$	$\Delta\delta$								
64 G. Libræ	5.8	+2.17	-16.9	-22 09.0	23 21 19.0	+ 2 09.2	+0.6550	0.5545	-0.1922	+67	- 9
169 B. Libræ	6.0	2.33	16.6	22 55.1	24 06 28.6	+10 58.9	-0.2196	0.5595	0.1719	+19	-58
177 B. Libræ	6.2	2.34	16.6	22 55.8	07 08.2	+11 37.1	-0.3202	0.5598	0.1704	+14	-64
42 Libræ	5.0	2.35	16.8	23 36.0	07 31.3	+11 59.3	+0.3074	0.5600	0.1695	+46	-28
A Scorpii	4.6	2.47	16.8	25 07.6	13 07.4	- 6 36.9	+0.9783	0.5628	0.1561	+65	+12
31 B. Scorpii	5.4	+2.46	-16.6	-24 20.0	13 15.2	- 6 29.4	+0.1354	0.5629	-0.1558	+35	-37
32 B. Scorpii	5.3	2.45	16.4	23 46.7	13 16.4	- 6 28.3	-0.4438	0.5629	0.1558	+ 6	-73
3 Scorpii	5.9	2.47	16.7	25 02.7	13 33.8	- 6 11.6	+0.8252	0.5630	0.1550	+65	+ 2
40 B. Scorpii	5.4	2.50	16.5	24 38.3	15 12.6	- 4 36.4	+0.1510	0.5639	0.1510	+36	-36
48 B. Scorpii	4.9	2.54	16.6	25 40.7	17 11.4	- 2 42.0	+0.9383	0.5648	0.1460	+65	+10
50 B. Scorpii	6.4	+2.54	-16.2	-24 32.5	17 26.3	- 2 27.6	-0.2786	0.5649	-0.1453	+13	-62
24 G. Scorpii	6.2	2.56	16.0	24 17.0	19 05.2	- 0 52.5	-0.7837	0.5657	0.1412	-13	-90
65 B. Scorpii	5.5	2.59	16.5	26 08.8	19 10.1	- 0 47.8	+1.1416	0.5657	0.1410	+64	+27
85 B. Scorpii	6.0	2.62	16.0	25 18.4	21 59.2	+ 1 55.1	-0.1184	0.5670	0.1337	+20	-52
σ Scorpii	3.0	2.67	15.8	25 26.0	25 00 35.2	+ 4 25.3	-0.3264	0.5681	0.1269	+10	-65
α Sco. (Antares)	1.3	+2.74	-15.6	-26 17.1	03 57.4	+ 7 39.9	+0.1484	0.5694	-0.1178	+33	-36
116 B. Scorpii	6.2	2.75	15.5	26 23.6	04 46.0	+ 8 26.6	+0.1670	0.5697	0.1157	+33	-35
134 B. Scorpii	6.4	2.86	15.1	27 19.9	10 02.0	-10 29.5	+0.5771	0.5716	0.1012	+55	-12
95 G. Ophiuchi	6.1	3.04	13.5	27 40.9	21 26.3	+ 0 28.7	-0.0254	0.5744	0.0686	+19	-46
43 Ophiuchi	5.4	3.12	12.8	28 04.9	26 01 51.0	+ 4 43.1	+0.1196	0.5751	0.0558	+26	-38
163 G. Ophiuchi	6.3	+3.22	-11.3	-27 51.3	09 53.5	-11 33.0	-0.4714	0.5755	-0.0320	- 7	-76
X Sagitt. (var.)	4.4	3.24	11.0	27 48.6	11 36.7	- 9 53.8	-0.5713	0.5754	0.0269	-12	-86
10 G. Sagittarii	5.7	3.29	10.3	28 03.5	15 17.7	- 6 21.3	-0.3880	0.5752	0.0159	- 4	-70
210 B. Scorpii	5.8	3.32	10.3	28 45.3	16 04.6	- 5 36.2	+0.3374	0.5752	0.0136	+34	-26
W Sagitt. (var.)	4.3	3.38	10.0	29 35.3	18 38.3	- 3 08.4	+1.1926	0.5748	0.0060	+61	+37
38 B. Sagittarii	4.7	+3.36	- 9.5	-28 28.1	19 53.5	- 1 56.1	+0.0039	0.5747	-0.0023	+15	-45
C. D.—28° 14268	6.4	3.39	9.2	28 55.2	21 27.6	- 0 25.6	+0.4823	0.5744	+0.0023	+42	-17
48 G. Sagittarii	6.3	3.40	8.8	28 18.9	23 39.9	+ 1 41.6	-0.1464	0.5739	0.0088	+ 8	-54
62 B. Sagittarii	6.0	3.41	8.7	28 40.7	23 40.2	+ 1 41.9	+0.2389	0.5739	0.0088	+28	-31
58 G. Sagittarii	6.1	3.42	8.3	28 27.9	27 01 32.4	+ 3 29.8	+0.0341	0.5735	0.0144	+17	-43
τ Sagittarii	3.5	+3.55	- 4.2	-27 46.4	20 02.6	- 2 42.0	+0.0572	0.5665	+0.0671	+23	-41
183 B. Sagittarii	6.2	3.59	4.2	28 44.8	20 16.1	- 2 29.0	+1.1100	0.5664	0.0677	+62	+26
234 B. Sagittarii	5.9	3.60	2.4	28 00.1	28 03 25.4	+ 4 24.5	+0.8698	0.5624	0.0869	+62	+ 6
248 B. Sagittarii	5.7	3.59	- 1.9	27 07.6	05 43.0	+ 6 37.0	+0.1416	0.5611	0.0929	+30	-37
ω Sagittarii	4.8	3.61	+ 0.8	26 29.0	16 55.6	- 6 34.5	+0.6508	0.5536	0.1208	+61	- 8
A Sagittarii	4.9	+3.61	+ 1.1	-26 23.0	18 18.0	- 5 15.0	+0.7112	0.5527	+0.1240	+64	- 5
56 B. Capricorni	6.3	3.56	5.4	24 01.5	29 12 54.0	-11 17.4	+0.8617	0.5384	0.1641	+66	+ 4
17 Capricorni	5.8	3.47	5.7	21 45.9	15 43.1	- 8 33.8	-1.1185	0.5362	0.1696	-31	-90
χ Capricorni	5.3	3.44	7.8	21 28.2	30 02 20.5	+ 1 42.9	+0.4643	0.5278	0.1885	+58	-20
27 Capricorni	6.1	3.43	7.8	20 49.9	02 49.2	+ 2 10.7	-0.1386	0.5274	0.1893	+27	-53
ϕ Capricorni	5.3	+3.42	+ 8.4	-20 56.2	05 46.2	+ 5 02.0	+0.5408	0.5251	+0.1941	+63	-16
128 B. Capricorni	6.5	3.35	9.6	19 26.8	12 50.8	+11 53.4	+0.3294	0.5196	0.2048	+53	-27
δ Capricorni	2.9	3.25	10.7	16 26.3	21 26.4	- 3 46.7	-1.1487	0.5132	0.2163	-27	-90
152 B. Capricorni	6.5	3.25	11.2	17 09.9	23 03.8	- 2 12.2	-0.0008	0.5120	0.2184	+37	-45
39 Aquarii	6.2	3.14	12.7	14 31.8	31 10 37.2	+ 9 00.7	+0.2882	0.5041	0.2313	+25	-61
42 Aquarii	5.5	+3.10	+12.8	-13 10.4	12 56.5	+11 16.0	-1.2406	0.5026	+0.2335	-32	-90
45 Aquarii	6.1	3.10	13.1	13 38.8	14 06.6	-11 35.9	-0.4459	0.5019	0.2346	+17	-71
50 Aquarii	5.9	3.09	13.5	13 52.6	17 00.6	- 8 46.7	+0.4899	0.5001	0.2373	+66	-19
182 B. Aquarii	6.2	+3.07	+13.8	-13 15.9	20 00.3	- 5 52.2	+0.5330	0.4984	+0.2398	+71	-17

Full Moon—July 29^d 12^h 47^m.5

ELEMENTS OF OCCULTATIONS, 1931.

547

AUGUST.

THE STAR'S					AT CONJUNCTION IN R.A.					Limiting Parallels.	
Name.	Mag.	Reductions from 1931.0.		Apparent Declina- tion.	Greenwich Mean Time.	Hour Angle, H	Y	X	y'	N.	S.
		$\Delta\alpha$	$\Delta\delta$								
70 Aquarii	6.1	+2.06	+14.8	-10 55.0	1 00 05.4	+3 56.1	+0.4043	0.4930	+0.2473	+65	-24
h Aquarii	5.4	2.85	15.3	8 03.7	15 20.5	-11 04.0	-0.4313	0.4887	0.2527	+21	-70
φ Aquarii	4.6	2.79	15.4	6 25.0	20 29.6	-6 03.2	-0.9416	0.4868	0.2551	-6	-90
χ Aquarii	5.3	2.81	16.0	8 05.9	21 55.0	-4 40.1	+1.2808	0.4803	0.2557	+82	+30
96 Aquarii	5.7	2.76	15.6	5 29.8	23 21.3	-3 16.2	-1.2273	0.4858	0.2562	-26	-90
317 B. Aquarii	6.3	+2.76	+15.8	-6 16.8	2 00 05.5	-2 33.2	-0.1720	0.4855	+0.2565	+35	-54
337 B. Aquarii	6.4	2.72	15.9	4 54.2	05 06.6	+2 19.9	-0.4034	0.4840	0.2582	+24	-68
342 B. Aquarii	6.5	2.71	15.9	4 27.6	06 14.8	+3 26.3	-0.6016	0.4837	0.2585	+13	-82
20 Piscium	5.6	2.62	16.6	3 08.4	15 39.0	-11 24.8	+0.3785	0.4816	0.2605	+65	-26
80 B. Piscium	6.3	2.53	16.7	-0 52.9	3 01 30.7	-1 48.3	+0.4486	0.4804	0.2612	+72	-22
98 B. Piscium	6.3	+2.46	+16.7	+1 18.6	08 51.1	+5 20.7	-0.0637	0.4802	+0.2608	+41	-49
44 Piscium	6.1	2.42	16.8	1 33.7	13 14.6	+9 37.3	+0.8011	0.4802	0.2603	+90	-3
60 Piscium	6.2	2.29	16.1	6 22.2	4 01 51.7	-2 05.5	-1.2569	0.4817	0.2572	-28	-84
147 B. Piscium	5.9	2.33	16.0	4 55.8	02 23.9	-1 34.1	+0.4741	0.4818	0.2571	+73	-20
171 B. Piscium	6.3	2.24	16.6	6 07.0	08 57.0	+4 48.6	+0.8378	0.4833	0.2546	+90	-1
ε Piscium	4.4	+2.22	+16.2	+7 31.4	10 43.0	+6 31.8	-0.2708	0.4838	+0.2538	+31	-59
π Piscium	5.6	2.06	15.5	11 47.6	5 05 46.3	+1 04.0	-0.2498	0.4910	0.2425	+32	-54
19 Arietis	5.8	1.91	14.7	14 57.7	6 01 04.3	-4 10.5	+0.7887	0.5020	0.2253	+90	+2
27 Arietis	6.4	1.84	13.9	17 24.2	10 18.4	+4 47.4	+0.1469	0.5084	0.2148	+53	-30
μ Arietis	5.7	1.79	13.2	19 43.3	16 05.9	+10 24.3	-1.1613	0.5128	0.2074	-24	-71
47 Arietis	5.8	+1.74	+12.9	+20 23.8	23 53.6	-6 02.4	-0.3193	0.5191	+0.1963	+28	-51
ε Arietis	4.6	1.73	12.7	21 04.1	7 00 26.8	-5 30.2	-0.9410	0.5196	0.1955	-8	-69
ζ Arietis	4.8	1.67	12.7	20 47.6	08 02.5	+1 51.0	+0.7981	0.5261	0.1835	+90	+9
τ Arietis	5.1	1.65	12.6	20 54.2	11 02.8	+4 45.5	+1.2217	0.5287	0.1784	+90	+39
66 Arietis	6.1	1.62	12.0	22 34.2	14 25.4	+8 01.7	+0.0109	0.5318	0.1723	+45	-31
16 Tauri	5.4	+1.57	+11.4	+24 04.6	21 57.8	-8 41.1	-0.3651	0.5386	+0.1581	+25	-48
17 Tauri	3.8	1.57	11.4	23 54.0	21 59.8	-8 39.1	-0.1703	0.5386	0.1580	+35	-38
18 Tauri	5.6	1.57	11.2	24 37.6	22 07.2	-8 32.1	-0.9323	0.5387	0.1578	-9	-66
γ Tauri	4.3	1.57	11.3	24 15.3	22 08.7	-8 30.6	-0.5284	0.5388	0.1577	+16	-58
20 Tauri	4.1	1.56	11.3	24 09.4	22 25.7	-8 14.1	-0.3774	0.5390	0.1571	+24	-49
21 Tauri	5.8	+1.56	+11.3	+24 20.6	22 27.8	-8 12.1	-0.5730	0.5391	+0.1571	+13	-60
22 Tauri	6.5	1.56	11.3	24 19.0	22 31.6	-8 08.5	-0.5345	0.5392	0.1569	+15	-58
23 Tauri	4.3	1.56	11.5	23 44.3	22 39.6	-8 00.8	+0.1093	0.5393	0.1567	+51	-24
γ Tauri	2.9	1.56	11.4	23 53.8	23 11.1	-7 30.3	+0.0210	0.5398	0.1556	+46	-28
104 B. Tauri	5.5	1.55	11.6	23 12.8	23 35.1	-7 07.1	+0.8162	0.5401	0.1548	+90	+13
27 Tauri	3.7	+1.55	+11.4	+23 50.8	23 56.8	-6 46.2	+0.1919	0.5404	+0.1541	+56	-20
28 Tauri	5.2	1.55	11.4	23 55.8	23 57.4	-6 45.6	+0.1037	0.5404	0.1541	+51	-24
36 Tauri	5.6	1.50	11.2	23 55.2	8 06 45.4	-0 11.6	+1.1117	0.5467	0.1397	+90	+35
φ Tauri	5.5	1.48	10.3	26 18.3	09 34.8	+2 32.0	-1.0527	0.5493	0.1335	-19	-64
χ Tauri	5.3	1.44	10.5	25 28.2	14 42.2	+7 28.5	+0.4924	0.5540	0.1217	+78	0
17 B. Aurigæ	6.0	+1.35	+9.3	+27 47.2	9 03 27.6	-4 12.4	-0.6128	0.5650	+0.0896	+10	-57
38 B. Aurigæ	6.5	1.31	9.1	27 36.2	08 21.2	+0 28.4	-0.0127	0.5688	0.0764	+44	-22
47 B. Aurigæ	6.0	1.30	9.0	27 56.9	10 26.4	+2 28.8	-0.2218	0.5704	0.0706	+32	-32
154 B. Tauri	6.4	1.26	8.8	27 53.5	15 00.0	+6 52.0	+0.1305	0.5738	0.0577	+53	-13
22 Aurigæ	6.4	1.27	8.4	28 52.5	15 57.0	+7 46.8	-0.8474	0.5744	0.0550	-5	-62
β Tauri	1.7	+1.26	+8.4	+28 33.2	17 07.5	+8 54.5	-0.4471	0.5753	+0.0516	+19	-43
107 B. Aurigæ	6.5	1.22	8.6	27 37.3	20 59.4	-11 22.7	+0.7056	0.5778	0.0402	+90	+19
116 B. Aurigæ	5.9	1.22	8.1	29 10.8	22 18.6	-10 06.4	-0.8720	0.5785	0.0362	-7	-61
106 B. Tauri	5.6	1.18	8.2	27 57.1	10 02 56.2	-5 39.9	+0.5444	0.5812	0.0222	+83	+12
36 Tauri	4.6	1.17	8.2	27 36.0	03 52.2	-4 46.2	+0.9292	0.5817	0.0194	+90	+33
154 B. Aurigæ	6.4	+1.17	+7.8	+28 56.1	05 07.3	-3 34.1	-0.4382	0.5824	+0.0155	+20	-41
115 B. Tauri	6.1	+1.15	+8.1	+27 34.4	06 52.9	-1 52.7	+0.9998	0.5832	+0.0101	+90	+39

Last Quarter—Aug. 6^d 16^h 27^m.8

THE STAR'S					AT CONJUNCTION IN R.A.					Limiting Parallels.	
Name.	Mag.	Reductions from 1931-0.		Apparent Declina- tion.	Greenwich Mean Time.	Hour Angle, H	Y	x'	y'	N.	S.
		$\Delta\alpha$	$\Delta\delta$								
183 B. Aurigæ	6.3	+1.15	+7.4	+29 31.3	10 08 56.9	+0 06.4	-1.0087	0.5842	+0.0036	-17	-61
κ Aurigæ	4.4	1.12	7.1	29 31.6	12 27.3	+3 28.3	-1.0187	0.5856	-0.0074	-18	-61
211 B. Aurigæ	6.3	1.11	7.1	29 34.6	14 42.4	+5 38.0	-1.0925	0.5805	0.0145	-25	-61
49 Aurigæ	5.1	1.07	7.1	28 04.8	20 08.0	+10 50.4	+0.3267	0.5881	0.0318	+65	0
53 Aurigæ	5.6	1.07	6.8	29 02.8	21 20.8	-11 59.7	-0.7097	0.5883	0.0357	+4	-60
54 Aurigæ	5.8	+1.06	+7.0	+28 19.6	21 48.3	-11 33.3	+0.0138	0.5885	-0.0371	+46	-17
28 Geminorum	5.5	1.06	6.7	29 02.7	23 47.9	-9 38.6	-0.8028	0.5889	0.0435	-2	-61
47 Geminorum	5.6	0.98	6.4	26 58.4	11 02.6	+0 11.3	+0.7041	0.5898	0.0762	+90	+16
53 Geminorum	5.9	0.98	6.1	28 01.2	11 47.0	+1 51.2	-0.5022	0.5898	0.0818	+16	-49
134 B. Geminorum	6.5	0.98	6.2	26 49.0	12 13.2	+2 16.4	+0.6889	0.5897	0.0832	+90	+14
59 Geminorum	5.7	+0.97	+6.0	+27 46.5	15 05.3	+5 01.5	-0.5379	0.5895	-0.0922	+15	-52
ι Geminorum	3.8	0.96	5.8	27 56.3	15 32.4	+5 27.5	-0.7464	0.5895	0.0936	+2	-63
b ¹ Geminorum	5.0	0.96	5.7	28 15.8	16 55.3	+6 47.0	-1.2085	0.5893	0.0979	-37	-62
b ² Geminorum	5.0	0.96	5.8	28 03.7	17 06.4	+6 57.7	-1.0212	0.5893	0.0985	-18	-62
ν Geminorum	4.3	0.94	+5.7	27 03.1	19 28.2	+9 13.7	-0.2366	0.5890	0.1058	+31	-36
89 Leonis	5.7	+0.78	-3.7	+3 26.6	15 23 00.7	+9 03.5	+1.1126	0.5416	-0.2910	+90	+17
β Virginis	3.8	0.86	4.8	2 09.1	18 06 26.0	-7 46.3	+0.2203	0.5396	0.2930	+57	-34
27 B. Virginis	6.5	0.84	5.2	+0 54.8	10 17.8	-4 02.3	+0.3137	0.5387	0.2933	+62	-29
13 Virginis	5.9	0.90	6.2	-0 24.3	19 19.2	+4 41.0	-1.0262	0.5374	0.2926	-9	-90
MARS	1.7	..	..	3 34.6	17 04 56.8	-10 00.8	-0.6839	0.5136	0.2787	+10	-90
319 B. Virginis	6.3	+0.97	-8.6	-5 55.6	08 38.1	-6 26.9	+0.5913	0.5370	-0.2872	+79	-15
g Virginis	5.6	1.04	10.1	8 37.1	18 17.0	+2 52.6	+0.5351	0.5379	-0.2804	+75	-18
a Virg. (Spica)	1.2	1.11	11.2	10 48.3	18 01 53.9	+10 14.2	+0.6146	0.5392	0.2732	+78	-13
86 Virginis	5.6	1.22	12.0	12 05.1	11 19.1	-4 39.7	-0.6259	0.5415	0.2623	+9	-85
621 B. Virginis	6.4	1.32	13.2	14 38.7	19 37.9	+3 22.0	-0.1836	0.5442	0.2509	+31	-55
214 G. Virginis	6.5	+1.32	-13.7	-16 00.6	19 58.2	+3 41.6	+1.1100	0.5443	-0.2504	+74	+18
40 H. Virginis	5.1	1.36	13.8	15 58.8	22 28.6	+6 06.8	+0.4584	0.5452	0.2466	+63	-21
43 B. Libræ	5.7	1.72	16.9	21 06.6	19 18 51.9	+1 47.1	+1.0035	0.5535	0.2100	+69	+12
47 G. Libræ	6.1	1.74	16.0	21 46.1	22 45.9	+5 32.6	+0.8746	0.5552	0.2019	+69	+4
64 G. Libræ	5.8	1.81	16.0	22 09.0	20 03 00.8	+9 38.4	+0.4272	0.5571	0.1927	+55	-22
169 B. Libræ	6.0	+1.98	-16.0	-22 55.1	12 04.6	-5 37.7	-0.4366	0.5610	-0.1718	+8	-72
177 B. Libræ	6.2	1.99	16.0	22 55.8	12 43.8	-4 59.9	-0.5362	0.5612	0.1703	+3	-80
42 Libræ	5.0	2.00	16.2	23 36.0	13 06.6	-4 37.8	+0.0886	0.5614	0.1694	+35	-40
A Scorpii	4.6	2.12	16.5	25 07.6	18 40.2	+0 43.3	+0.7614	0.5636	0.1557	+65	-2
31 B. Scorpii	5.4	2.11	16.2	24 20.0	18 47.9	+0 50.7	-0.0781	0.5637	0.1554	+24	-49
32 B. Scorpii	5.3	+2.11	-16.0	-23 46.7	18 49.1	+0 51.8	-0.6551	0.5637	-0.1552	-5	-90
3 Scorpii	5.9	2.12	16.4	25 02.7	19 06.4	+1 08.5	+0.6093	0.5638	0.1546	+61	-11
40 B. Scorpii	5.4	2.15	16.1	24 38.3	20 44.6	+2 43.0	-0.0609	0.5644	0.1505	+25	-48
π Scorpii	3.0	2.16	16.6	25 55.3	20 50.4	+2 48.7	+1.2520	0.5645	0.1502	+65	+40
48 B. Scorpii	4.9	2.20	16.4	25 40.7	22 42.6	+4 36.6	+0.7255	0.5652	0.1454	+65	-4
50 B. Scorpii	6.4	+2.19	-16.0	-24 32.5	22 57.4	+4 50.9	-0.4873	0.5653	-0.1448	+3	-77
24 G. Scorpii	6.2	2.22	15.8	24 17.0	21 00 35.8	+6 25.5	-0.9895	0.5658	-0.1405	+26	-90
65 B. Scorpii	5.5	2.25	16.4	26 08.8	00 40.7	+6 30.2	+0.9302	0.5658	0.1403	+64	+9
85 B. Scorpii	6.0	2.29	15.9	25 18.4	03 29.1	+9 12.4	-0.3237	0.5668	0.1329	+10	-65
σ Scorpii	3.0	2.34	15.7	25 26.0	06 04.5	+11 41.9	-0.5288	0.5676	0.1260	-1	-80
a Sco. (Antares)	1.3	+2.41	-15.7	-26 17.1	09 26.2	-9 04.0	-0.0519	0.5687	-0.1168	+23	-48
116 B. Scorpii	6.2	2.43	15.6	26 23.6	10 14.6	-8 17.4	-0.0325	0.5689	0.1146	+23	-47
134 B. Scorpii	6.4	2.54	15.4	27 19.9	15 30.3	+3 13.9	+0.3826	0.5702	0.1000	+44	-23
95 G. Ophiuchi	6.1	2.76	14.1	27 40.9	22 02 55.6	+7 45.4	-0.2071	0.5721	0.0672	+10	-57
43 Ophiuchi	5.4	2.85	13.6	28 04.9	07 21.2	-11 59.3	-0.0567	0.5724	0.0543	+16	-48
163 G. Ophiuchi	6.3	+2.99	-12.2	-27 51.4	15 26.0	-4 13.1	-0.6390	0.5722	-0.0306	-16	-90
X Sagitt. (var.)	4.4	+3.01	-11.9	-27 48.6	17 09.9	-2 33.2	-0.7371	0.5720	-0.0254	-21	-90

New Moon—Aug. 13^d 20^h 27^m.0First Quarter—Aug. 20^d 11^h 36^m.3

ELEMENTS OF OCCULTATIONS, 1931.

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AUGUST.

THE STAR'S					AT CONJUNCTION IN R.A.					Limiting Parallels.	
Name.	Mag.	Reductions from 1931.0.		Apparent Declina- tion.	Greenwich Mean Time.	Hour Angle, H	Y	α'	γ'	N.	S.
		$\Delta\alpha$	$\Delta\delta$								
10 G. Sagittarii	5.7	+3.09	-11.3	-28 03.5	22 20 52.3	+ 1 00.7	-0.5489	0.5716	-0.0145	-13	-8
210 B. Scorpii	5.8	3.12	11.3	28 45.4	21 39.5	+ 1 46.3	+0.1790	0.5715	0.0122	+25	-35
W Sagitt. (var.)	4.3	3.18	11.1	29 35.3	23 00 14.4	+ 4 15.0	+1.0396	0.5710	0.0046	+61	+20
38 B. Sagittarii	4.7	3.17	10.6	28 28.1	01 30.2	+ 5 27.9	-0.1502	0.5708	-0.0010	+ 7	-54
C. D. -28° 14268	6.4	3.21	10.4	28 55.2	03 05.0	+ 6 59.2	+0.3313	0.5704	+0.0037	+32	-26
48 G. Sagittarii	6.3	+3.23	- 9.9	-28 18.9	05 18.5	+ 9 07.6	-0.2960	0.5699	+0.0102	0	-63
62 B. Sagittarii	6.0	3.24	9.9	28 40.7	05 18.8	+ 9 07.9	+0.0903	0.5699	0.0102	+20	-40
58 G. Sagittarii	6.1	3.26	9.4	28 27.9	07 12.0	+10 56.8	-0.1126	0.5694	0.0156	+10	-52
7 Sagittarii	3.5	3.49	5.6	27 46.5	24 01 53.3	+ 4 56.1	-0.0634	0.5619	0.0681	+17	-49
183 B. Sagittarii	6.2	3.52	5.6	28 44.8	02 07.0	+ 5 09.3	+0.9938	0.5618	0.0687	+62	+16
234 B. Sagittarii	5.9	+3.58	- 3.8	-28 00.1	09 21.2	-11 52.4	+0.7636	0.5578	+0.0878	+62	- 1
248 B. Sagittarii	5.7	3.58	3.1	27 07.6	11 40.2	- 9 38.4	+0.0358	0.5565	0.0937	+25	-43
ω Sagittarii	4.8	3.66	0.4	26 29.0	23 00.8	+ 1 18.1	+0.5649	0.5492	0.1215	+56	-13
A Sagittarii	4.9	3.66	- 0.1	26 23.0	25 00 24.1	+ 2 38.6	+0.6278	0.5483	0.1247	+61	-10
56 B. Capricorni	6.3	3.72	+ 4.7	24 01.6	19 12.9	- 3 10.9	+0.8100	0.5347	0.1648	+66	+ 1
χ Capricorni	5.3	+3.66	+ 7.6	-21 28.2	26 08 47.7	+ 9 57.5	+0.4345	0.5246	+0.1892	+57	-21
27 Capricorni	6.1	3.65	7.7	20 49.9	09 16.8	+10 25.7	-0.1698	0.5243	0.1900	+25	-54
ϕ Capricorni	5.3	3.66	8.3	20 56.2	12 15.4	-10 41.2	+0.5174	0.5221	0.1948	+61	-17
128 B. Capricorni	6.5	3.62	9.8	19 26.8	19 23.9	- 3 46.0	+0.3180	0.5170	0.2056	+53	-28
δ Capricorni	2.9	3.56	11.4	16 26.3	27 04 03.6	+ 4 38.1	-1.1494	0.5111	0.2173	-27	-90
152 B. Capricorni	6.5	+3.57	+11.8	-17 09.9	05 41.7	+ 6 13.3	+0.0055	0.5100	+0.2193	+36	-44
39 Aquarii	6.2	3.50	13.9	14 31.8	17 19.7	- 6 29.2	-0.2615	0.5027	0.2324	+27	-59
42 Aquarii	5.5	3.47	14.3	13 10.3	19 39.8	- 4 13.1	-1.2123	0.5013	0.2347	-29	-90
45 Aquarii	6.1	3.48	14.5	13 38.8	20 50.3	- 3 04.6	-0.4132	0.5007	0.2358	+19	-69
50 Aquarii	5.9	3.48	14.9	13 52.5	23 45.3	- 0 14.5	+0.5306	0.4990	0.2385	+71	-17
182 B. Aquarii	6.2	+3.47	+15.3	-13 15.9	28 02 45.8	+ 2 40.9	+0.5792	0.4974	+0.2411	+73	-15
70 Aquarii	6.1	3.39	16.8	10 54.9	12 53.4	-11 28.4	+0.4683	0.4925	0.2488	+69	-21
λ Aquarii	5.4	3.32	17.8	8 03.7	22 10.2	- 2 26.8	-0.3529	0.4886	0.2543	+25	-65
ϕ Aquarii	4.6	3.28	18.1	6 25.0	29 03 20.0	+ 2 34.7	-0.8555	0.4868	0.2567	0	-90
χ Aquarii	5.3	3.30	18.6	8 05.9	04 45.5	+ 3 58.0	+1.3738	0.4864	0.2573	+80	+41
96 Aquarii	5.7	+3.26	+18.5	- 5 29.8	06 12.0	+ 5 22.1	-1.1370	0.4859	+0.2579	-19	-90
317 B. Aquarii	6.3	3.25	18.6	6 16.8	06 56.3	+ 6 05.2	-0.0784	0.4857	0.2582	+40	-49
337 B. Aquarii	6.4	3.24	18.9	4 54.2	11 57.9	+10 58.9	-0.3020	0.4843	0.2599	+29	-62
342 B. Aquarii	6.5	3.22	19.0	4 27.5	13 06.2	-11 54.6	-0.4988	0.4840	0.2602	+19	-74
20 Piscium	5.6	3.17	19.9	3 08.4	22 31.0	+ 2 44.7	+0.4977	0.4821	0.2622	+74	-20
80 B. Piscium	6.3	+3.11	+20.4	- 0 52.8	30 08 23.2	+ 6 51.9	+0.5822	0.4810	+0.2629	+81	-15
98 B. Piscium	6.3	3.06	20.6	+ 1 18.7	15 43.9	- 9 58.9	+0.0786	0.4808	0.2625	+49	-41
44 Piscium	6.1	3.03	20.8	1 33.8	20 07.6	- 5 42.1	+0.9506	0.4809	0.2619	+90	+ 5
60 Piscium	6.2	2.95	20.6	6 22.2	31 08 45.7	+ 6 36.0	-1.0983	0.4822	0.2586	-15	-84
147 B. Piscium	5.9	2.99	20.2	4 55.9	09 17.9	+ 7 07.4	+0.6378	0.4823	0.2584	+86	-12
171 B. Piscium	6.3	+2.92	+20.9	+ 6 07.0	15 51.7	-10 29.2	+1.0089	0.4836	+0.2557	+90	+10
ϵ Piscium	4.4	+2.90	+20.7	+ 7 31.5	17 38.0	- 8 45.7	-0.1016	0.4840	+0.2549	+40	-49

SEPTEMBER.

π Piscium	5.6	+2.80	+20.1	+11 47.7	1 12 45.3	+ 9 50.7	-0.0673	0.4904	+0.2430	+41	-45
19 Arietis	5.8	2.71	19.3	14 57.8	2 08 11.1	+ 4 43.8	+0.9845	0.5002	0.2250	+90	+14
27 Arietis	6.4	2.67	18.4	17 24.3	17 30.5	-10 12.7	+0.3404	0.5061	0.2141	+65	-20
μ Arietis	5.7	2.64	17.5	19 43.4	23 21.9	- 4 32.1	-0.9771	0.5100	0.2065	-10	-71
47 Arietis	5.8	2.61	17.1	20 23.9	8 07 15.5	+ 3 07.2	-0.1298	0.5157	0.1952	+38	-41
ϵ Arietis	4.6	+2.60	+16.8	+21 04.2	07 49.2	+ 3 39.9	-0.7566	0.5161	+0.1943	+ 4	-69
ζ Arietis	4.8	2.55	16.5	20 47.7	15 31.6	+11 07.9	+0.9955	0.5219	0.1820	+90	+21
66 Arietis	6.1	2.52	15.6	22 34.3	22 00.7	- 6 35.4	+0.1996	0.5271	0.1708	+56	-21
7 Tauri	5.9	+2.52	+14.9	+24 14.3	4 00 50.0	- 3 51.6	-1.1401	0.5294	+0.1656	-25	-66

Full Moon—Aug. 28^d 0^h 09^m.5

THE STAR'S					AT CONJUNCTION IN R.A.					Limiting Parallels.	
Name.	Mag.	Reductions from 1931.0.		Apparent Declina- tion.	Greenwich Mean Time.	Hour Angle, H	Y	x'	y'	N.	S.
		$\Delta\alpha$	$\Delta\delta$								
16 Tauri	5.4	+2.48	+14.7	+24 04.7	4 05 41.0	+ 0 49.9	-0.1830	0.5333	+0.1563	+35	-39
17 Tauri	3.8	2.48	14.7	23 54.1	05 43.2	+ 0 51.9	+0.0137	0.5333	0.1563	+46	-29
18 Tauri	5.6	2.49	14.5	24 37.7	05 50.6	+ 0 59.1	-0.7559	0.5334	0.1560	+ 3	-66
q Tauri	4.3	2.48	14.6	24 15.4	05 52.2	+ 1 00.7	-0.3480	0.5334	0.1560	+26	-48
20 Tauri	4.1	2.48	14.6	24 09.5	06 09.5	+ 1 17.3	-0.1957	0.5337	0.1554	+34	-39
21 Tauri	5.8	+2.48	+14.6	+24 20.7	06 11.6	+ 1 19.4	-0.3932	0.5337	+0.1554	+23	-50
22 Tauri	6.5	2.48	14.6	24 19.1	06 15.5	+ 1 23.1	-0.3543	0.5338	0.1552	+25	-48
23 Tauri	4.3	2.47	14.8	23 44.3	06 23.7	+ 1 31.1	+0.2958	0.5339	0.1550	+63	-14
7 Tauri	2.9	2.47	14.7	23 53.8	06 55.8	+ 2 02.1	+0.2063	0.5343	0.1539	+57	-19
104 B. Tauri	5.5	2.46	14.9	23 12.9	07 20.2	+ 2 25.7	+1.0094	0.5346	0.1531	+90	+25
27 Tauri	3.7	+2.46	+14.6	+23 50.9	07 42.4	+ 2 47.2	+0.3786	0.5350	+0.1524	+68	-10
28 Tauri	5.2	2.47	14.6	23 55.9	07 43.0	+ 2 47.8	+0.2895	0.5350	0.1523	+62	-15
p Tauri	5.5	2.42	13.1	26 18.4	17 31.9	-11 43.3	-0.8839	0.5430	0.1317	- 6	-64
x Tauri	5.3	2.37	13.0	25 28.3	22 46.0	- 6 40.1	+0.6747	0.5472	0.1198	+90	+ 9
17 B. Aurigæ	6.0	2.30	11.0	27 47.2	5 11 48.9	+ 5 54.9	-0.4515	0.5573	0.0879	+19	-47
38 B. Aurigæ	6.5	+2.25	+10.6	+27 36.2	16 49.6	+10 44.6	+0.1518	0.5610	+0.0748	+54	-14
47 B. Aurigæ	6.0	2.23	10.3	27 56.9	18 57.8	-11 12.0	-0.0613	0.5624	0.0690	+41	-24
354 B. Tauri	6.4	2.19	9.9	27 53.5	23 38.4	- 6 41.8	+0.2915	0.5655	0.0562	+63	- 5
22 Aurigæ	6.4	2.20	9.4	28 52.5	6 00 36.8	- 5 45.6	-0.6987	0.5662	0.0535	+ 5	-60
β Tauri	1.7	2.18	9.3	28 33.2	01 49.0	- 4 36.2	-0.2946	0.5669	0.0501	+28	-35
107 B. Aurigæ	6.5	+2.13	+ 9.3	+27 37.3	05 46.8	- 0 47.3	+0.8684	0.5693	+0.0389	+90	+28
116 B. Aurigæ	5.9	2.14	8.6	29 10.8	07 08.1	+ 0 30.8	-0.7290	0.5700	0.0350	+ 3	-61
406 B. Tauri	5.6	2.08	8.6	27 57.1	11 52.8	+ 5 04.6	+0.7000	0.5726	0.0211	+90	+20
136 Tauri	4.6	2.06	8.6	27 36.0	12 50.2	+ 5 59.8	+1.0884	0.5730	0.0183	+90	+44
154 B. Aurigæ	6.4	2.07	8.0	28 56.1	14 07.2	+ 7 13.8	-0.2961	0.5736	0.0145	+28	-31
183 B. Aurigæ	6.3	+2.04	+ 7.3	+29 31.3	18 02.8	+11 00.3	-0.8768	0.5754	+0.0027	- 7	-61
κ Aurigæ	4.4	2.00	6.8	29 31.6	21 38.5	- 9 32.4	-0.8902	0.5768	-0.0081	- 8	-61
211 B. Aurigæ	6.3	1.99	6.7	29 34.6	23 57.0	- 7 19.3	-0.9668	0.5777	0.0152	-14	-61
49 Aurigæ	5.1	1.91	6.5	28 04.8	7 05 30.9	- 1 58.7	+0.4631	0.5793	0.0323	+76	+ 7
53 Aurigæ	5.6	1.91	6.1	29 02.8	06 45.6	- 0 46.9	-0.5861	0.5796	0.0361	+11	-52
54 Aurigæ	5.8	+1.89	+ 6.2	+28 19.6	07 13.8	- 0 19.8	+0.1449	0.5797	-0.0376	+53	-18
28 Geminorum	5.5	1.89	5.8	29 02.6	09 16.3	+ 1 37.8	-0.6826	0.5802	0.0439	+ 6	-59
47 Geminorum	5.6	1.75	5.2	26 58.4	19 45.9	+11 42.4	+0.8290	0.5815	0.0763	+90	+23
53 Geminorum	5.9	1.75	4.7	28 01.2	21 32.7	-10 35.1	-0.3913	0.5815	0.0818	+23	-43
134 B. Geminorum	6.5	1.73	4.9	26 49.0	21 59.5	-10 09.3	-0.8111	0.5815	0.0831	+90	+21
59 Geminorum	5.7	+1.71	+ 4.3	+27 46.4	8 00 55.5	- 7 20.1	-0.4310	0.5815	-0.0921	+21	-46
i Geminorum	3.8	1.70	4.2	27 56.3	01 23.2	- 6 53.6	-0.6419	0.5815	0.0935	+ 8	-59
b ¹ Geminorum	5.0	1.70	3.9	28 15.8	02 48.0	- 5 32.2	-1.1098	0.5814	0.0978	-25	-62
b ² Geminorum	5.0	1.70	4.0	28 03.7	02 59.3	- 5 21.4	-0.9210	0.5814	0.0983	-10	-62
v Geminorum	4.3	1.66	3.9	27 03.1	05 24.2	- 3 02.2	-0.1317	0.5812	0.1056	+37	-30
c Geminorum	5.5	+1.61	+ 3.9	+25 57.0	08 38.4	+ 0 04.3	+0.6366	0.5808	-0.1153	+90	+ 8
φ Geminorum	4.9	1.59	3.2	26 56.8	12 19.8	+ 3 36.9	-0.8255	0.5802	0.1262	- 3	-64
ω Cancri	6.1	1.54	3.3	25 35.0	15 16.9	+ 6 27.0	+0.1779	0.5796	0.1347	+55	-17
4 Cancri	6.2	1.54	3.3	25 16.9	15 36.2	+ 6 45.6	+0.4419	0.5796	0.1357	+73	- 4
ψ Cancri	5.9	1.51	2.6	25 43.1	19 03.5	+10 04.7	-0.4881	0.5787	0.1455	+18	-53
λ Cancri	5.9	+1.46	+ 2.7	+24 14.5	23 05.2	-10 03.1	+0.4005	0.5776	-0.1568	+70	- 8
28 Cancri	6.1	1.43	2.2	24 22.5	9 02 18.8	- 6 57.0	-0.2552	0.5766	0.1655	+31	-42
v ¹ Cancri	5.7	1.42	2.1	24 18.9	03 28.6	- 5 50.0	-0.3885	0.5762	0.1686	+24	-50
v ² Cancri	6.4	1.41	2.0	24 19.3	04 04.4	- 5 15.5	-0.4955	0.5760	0.1703	+18	-56
90 H ¹ Cancri	6.1	1.26	+ 0.8	+21 34.1	20 35.5	+10 37.5	-0.8839	0.5694	0.2110	- 4	-69
a Virg. (<i>Spica</i>)	1.2	+0.91	- 9.8	-10 48.3	14 10 51.5	- 3 00.3	+0.5060	0.5484	-0.2788	+71	-19
550 B. Virginis	6.0	+0.92	-10.6	-12 51.8	15 01.7	+ 1 01.2	+1.3872	0.5496	-0.2741	+75	+45

Last Quarter—Sept. 5^d 07^h 21^m.2New Moon—Sept. 12^d 04^h 26^m.4

ELEMENTS OF OCCULTATIONS, 1931.

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SEPTEMBER.

THE STAR'S					AT CONJUNCTION IN R.A.					Limiting Parallels.	
Name.	Mag.	Reductions from 1931.0.		Apparent Declina- tion.	Greenwich Mean Time.	Hour Angle, H	Y	x'	y'	N.	S.
		$\Delta\alpha$	$\Delta\delta$								
36 Virginis	5.6	+0.98	-10.7	-12 05.0	14 19 58.3	+ 5 47.3	-0.7227	0.5511	-0.2678	+ 4	-90
21 B. Virginis	6.4	1.04	11.7	14 38.6	15 04 00.6	-10 27.4	-0.2928	0.5538	0.2560	+25	-61
14 G. Virginis	6.5	1.04	12.1	16 00.6	04 20.0	-10 08.6	+0.9802	0.5540	0.2555	+74	+ 9
40 H. Virginis	5.1	1.06	12.2	15 58.8	06 45.5	- 7 48.5	+0.3375	0.5549	0.2516	+56	-27
43 B. Libræ	5.7	1.36	15.5	21 06.6	16 02 28.5	+11 11.3	+0.8666	0.5628	0.2138	+69	+ 3
47 G. Libræ	6.1	+1.36	-14.5	-21 46.1	06 15.0	- 9 10.6	+0.7388	0.5643	-0.2055	+69	- 5
54 G. Libræ	5.8	1.42	14.6	22 08.9	10 21.9	- 5 12.9	+0.2975	0.5660	0.1960	+48	-29
53 B. Libræ	6.3	1.54	15.2	24 15.6	17 14.4	+ 1 24.0	+1.1460	0.5686	0.1794	+66	+25
59 B. Libræ	6.0	1.57	14.8	22 55.1	19 09.3	+ 3 14.5	-0.5549	0.5693	0.1746	+ 2	-82
77 B. Libræ	6.2	1.58	14.8	22 55.8	19 47.4	+ 3 51.3	-0.6533	0.5695	0.1729	- 3	-90
12 Libræ	5.0	+1.59	-15.0	-23 36.0	20 09.6	+ 4 12.6	-0.0371	0.5696	-0.1720	+28	-47
4 Scorpii	4.6	1.68	15.3	25 07.6	17 01 33.6	+ 9 24.3	+0.6266	0.5714	0.1579	+62	-10
31 B. Scorpii	5.4	1.68	15.1	24 20.0	01 41.1	+ 9 31.5	-0.2016	0.5715	0.1576	+18	-57
12 B. Scorpii	5.3	1.68	14.9	23 46.7	01 42.2	+ 9 32.6	-0.7709	0.5715	0.1575	-12	-90
3 Scorpii	5.9	1.69	15.3	25 02.7	01 59.0	+ 9 48.8	+0.4766	0.5716	0.1568	+54	-19
10 B. Scorpii	5.4	+1.72	-15.1	-24 38.3	03 34.5	+11 20.5	-0.1847	0.5721	-0.1525	+19	-56
π Scorpii	3.0	1.72	15.5	25 55.3	03 40.3	+11 26.1	+1.1109	0.5721	0.1523	+65	+23
18 B. Scorpii	4.9	1.76	15.4	25 40.7	05 29.4	-10 49.0	+0.5916	0.5726	0.1474	+59	-12
50 B. Scorpii	6.4	1.76	15.0	24 32.5	05 43.8	-10 35.2	-0.6054	0.5727	0.1467	- 3	-88
14 G. Scorpii	6.2	1.78	14.8	24 17.0	07 19.6	- 9 03.1	-1.1013	0.5731	0.1423	-34	-90
55 B. Scorpii	5.5	+1.80	-15.4	-26 08.8	07 24.4	- 8 58.4	+0.7938	0.5731	-0.1421	+64	0
53 B. Scorpii	6.0	1.84	15.0	25 18.4	10 08.4	- 6 20.7	-0.4438	0.5739	0.1345	+ 4	-73
σ Scorpii	3.0	1.89	14.9	25 26.0	12 39.8	- 3 55.2	-0.6463	0.5744	0.1274	- 7	-90
α Sco. (Antares)	1.3	1.96	15.0	26 17.1	15 56.6	- 0 46.1	-0.1748	0.5751	0.1181	+16	-55
16 B. Scorpii	6.2	1.97	15.0	26 23.6	16 43.9	- 0 00.6	-0.1554	0.5753	0.1158	+16	-54
34 B. Scorpii	6.4	+2.08	-14.9	-27 19.9	21 52.3	+ 4 55.8	+0.2559	0.5760	-0.1009	+37	-30
35 G. Ophiuchi	6.1	2.31	13.9	27 40.9	18 09 03.7	- 8 19.1	-0.3251	0.5766	0.0675	+ 4	-65
13 Ophiuchi	5.4	2.40	13.6	28 04.9	13 24.6	- 4 08.5	-0.1751	0.5764	0.0544	-10	-55
33 G. Ophiuchi	6.3	2.55	12.4	27 51.4	21 21.9	+ 3 30.2	-0.7504	0.5753	0.0303	-22	-90
X Sagitt. (var.)	4.4	2.58	12.2	27 48.6	23 04.3	+ 5 08.6	-0.8472	0.5750	0.0252	-28	-90
10 G. Sagittarii	5.7	+2.65	-11.7	-28 03.5	19 02 43.8	+ 8 39.5	-0.6595	0.5741	-0.0142	-19	-90
10 B. Scorpii	5.8	2.68	11.9	28 45.4	03 30.4	+ 9 24.4	+0.0635	0.5739	0.0119	+19	-41
γ Sagitt. (var.)	4.3	2.75	11.8	29 35.3	06 03.4	+11 51.4	+0.9192	0.5731	0.0042	+61	+10
38 B. Sagittarii	4.7	2.74	11.2	28 28.2	07 18.4	-10 56.5	-0.2621	0.5728	-0.0005	+ 1	-61
. D. -28° 14268	6.4	2.78	11.1	28 55.3	08 52.2	- 9 26.2	+0.2170	0.5722	+0.0041	+26	-32
18 G. Sagittarii	6.3	+2.82	-10.7	-28 19.0	11 04.3	- 7 19.3	-0.4056	0.5714	+0.0107	- 5	-71
52 B. Sagittarii	6.0	2.82	10.6	28 40.8	11 04.5	- 7 19.1	-0.0217	0.5714	0.0107	+14	-46
58 G. Sagittarii	6.1	2.85	10.2	28 27.9	12 56.6	- 5 31.2	-0.2225	0.5707	0.0162	+ 5	-58
τ Sagittarii	3.5	3.13	6.8	27 46.5	20 07 30.9	-11 38.9	-0.1654	0.5614	0.0686	+12	-55
33 B. Sagittarii	6.2	3.16	6.9	28 44.8	07 44.5	-11 25.7	+0.8882	0.5613	0.0692	+62	+ 8
34 B. Sagittarii	5.9	+3.25	- 5.2	-28 00.1	14 57.6	- 4 28.5	+0.6630	0.5567	+0.0883	+60	- 7
18 B. Sagittarii	5.7	3.26	4.5	27 07.7	17 16.5	- 2 14.7	-0.0614	0.5552	0.0942	+20	-48
ω Sagittarii	4.8	3.39	1.9	26 29.1	21 04 37.2	+ 8 42.0	+0.4733	0.5472	0.1218	+52	-19
A Sagittarii	4.9	3.40	- 1.6	26 23.0	06 00.7	+10 02.6	+0.5371	0.5462	0.1250	+55	-15
56 B. Capricorni	6.3	3.54	+ 3.2	24 01.6	22 00 53.5	+ 4 17.0	+0.7322	0.5319	0.1647	+66	- 4
X Capricorni	5.3	+3.55	+ 6.2	-21 28.2	14 33.0	- 6 29.7	+0.3667	0.5216	+0.1889	+53	-25
ϕ Capricorni	6.1	3.54	6.4	20 50.0	15 02.2	- 6 01.4	-0.2379	0.5213	0.1897	+22	-59
27 Capricorni	5.3	3.55	7.0	20 56.2	18 02.0	- 3 07.1	+0.4523	0.5190	0.1945	+59	-21
28 B. Capricorni	6.5	3.56	8.7	19 26.8	23 01 13.4	+ 3 50.9	+0.2582	0.5140	0.2053	+49	-31
δ Capricorni	2.9	3.54	10.7	16 26.3	09 56.6	-11 41.6	-1.2046	0.5082	0.2170	-32	-90
52 B. Capricorni	6.5	+3.55	+11.0	-17 09.9	11 35.5	-10 05.6	-0.0467	0.5071	+0.2190	+35	-47
39 Aquarii	6.2	+3.53	+13.4	-14 31.8	23 18.2	+ 1 16.7	-0.3046	0.5002	+0.2321	+25	-62

First Quarter—Sept. 18^d 20^h 37^m.3

SEPTEMBER.

THE STAR'S					AT CONJUNCTION IN R.A.					Limiting Parallels.	
Name.	Mag.	Reductions from 1931-0.		Apparent Declina- tion.	Greenwich Mean Time.	Hour Angle, H	Y	x'	y'	N.	S.
		$\Delta\alpha$	$\Delta\delta$								
45 Aquarii	6.1	+3.53	+14.2	13 38.8	24 02 50.1	+ 4 42.7	-0.4537	0.4983	+0.2356	+17	-0
50 Aquarii	5.9	3.54	14.6	13 52.5	05 46.2	+ 7 33.8	+0.4942	0.4967	0.2383	+68	-19
182 B. Aquarii	6.2	3.54	15.1	13 15.9	08 47.9	+10 30.4	+0.5454	0.4952	0.2409	+71	-17
70 Aquarii	6.1	3.51	16.9	10 54.9	18 58.9	- 3 35.4	+0.4427	0.4907	0.2487	+67	-22
h Aquarii	5.4	3.48	18.4	8 03.7	25 04 18.4	+ 5 28.9	-0.3721	0.4873	0.2544	+25	-66
ϕ Aquarii	4.6	+3.46	+19.0	- 6 25.0	09 29.4	+10 31.6	-0.8712	0.4857	+0.2569	- 1	-90
96 Aquarii	5.7	3.45	19.6	5 29.8	12 22.1	-10 40.4	-1.1507	0.4849	0.2582	-20	-90
317 B. Aquarii	6.3	3.45	19.5	6 16.8	13 06.5	- 9 57.1	-0.0900	0.4847	0.2585	+30	-50
337 B. Aquarii	6.4	3.45	20.0	4 54.2	18 09.1	- 5 02.5	-0.3098	0.4836	0.2603	+28	-62
342 B. Aquarii	6.5	3.45	20.2	4 27.5	19 17.5	- 3 55.9	-0.5060	0.4834	0.2606	+18	-75
20 Piscium	5.6	+3.43	+21.3	- 3 08.4	26 04 43.6	+ 5 15.2	+0.4990	0.4819	+0.2628	+74	-20
80 B. Piscium	6.3	3.41	22.2	- 0 52.8	14 36.4	- 9 07.4	+0.5906	0.4812	0.2637	+82	-15
98 B. Piscium	6.3	3.39	22.7	+ 1 18.7	21 57.3	- 1 58.1	+0.0917	0.4812	0.2634	+50	-41
44 Piscium	6.1	3.38	23.0	1 33.8	27 02 21.0	+ 2 18.8	+0.9675	0.4815	0.2628	+90	+ 6
60 Piscium	6.2	3.35	23.4	6 22.3	14 58.4	- 9 23.7	-1.0757	0.4832	0.2597	-13	-84
147 B. Piscium	5.9	+3.40	+22.7	+ 4 56.0	15 30.6	- 8 52.4	+0.6625	0.4833	+0.2595	+88	-10
171 B. Piscium	6.3	3.35	23.7	6 07.1	22 03.9	- 2 29.5	+1.0377	0.4848	0.2569	+90	+12
e Piscium	4.4	3.34	23.7	7 31.5	23 49.9	- 0 46.2	-0.0730	0.4852	0.2560	+41	-48
π Piscium	5.6	3.33	23.5	11 47.7	28 18 55.5	- 6 11.7	-0.0299	0.4918	0.2441	+43	-43
19 Arietis	5.8	3.32	22.8	14 57.8	29 14 20.4	-11 19.3	+1.0308	0.5014	0.2258	+90	+17
27 Arietis	6.4	+3.32	+21.9	+17 24.3	23 40.2	- 2 15.8	+0.3874	0.5069	+0.2147	+68	-18
μ Arietis	5.7	3.33	21.2	19 43.5	30 05 32.1	+ 3 25.6	-0.9337	0.5106	0.2069	- 7	-71
47 Arietis	5.8	3.33	20.6	20 23.9	13 27.1	+11 06.3	-0.0823	0.5158	0.1954	+40	-39
e Arietis	4.6	3.32	20.4	21 04.3	14 01.0	+11 39.1	-0.7118	0.5162	0.1945	+ 6	-69
ζ Arietis	4.8	+3.30	+19.8	+20 47.7	21 45.5	- 4 50.8	+1.0494	0.5216	+0.1820	+90	+25

OCTOBER.

66 Arietis	6.1	+3.30	+18.8	+22 34.4	1 04 17.1	+ 1 28.4	+0.2498	0.5263	+0.1706	+59	-19
7 Tauri	5.9	3.32	18.2	24 14.4	07 07.7	+ 4 13.6	-1.0978	0.5283	0.1654	-21	-66
16 Tauri	5.4	3.30	17.7	24 04.7	12 01.1	+ 8 57.4	-0.1350	0.5318	0.1560	+37	-36
17 Tauri	3.8	3.29	17.8	23 54.2	12 03.3	+ 8 59.6	+0.0630	0.5318	0.1559	+48	-26
18 Tauri	5.6	3.30	17.5	24 37.7	12 10.8	+ 9 06.8	-0.7116	0.5319	0.1557	+ 5	-66
q Tauri	4.3	+3.30	+17.6	+24 15.4	12 12.3	+ 9 08.2	-0.3011	0.5320	+0.1556	+28	-45
20 Tauri	4.1	3.30	17.6	24 09.5	12 29.8	+ 9 25.2	-0.1478	0.5322	0.1550	+37	-37
21 Tauri	5.8	3.30	17.6	24 20.7	12 32.0	+ 9 27.4	-0.3466	0.5322	0.1550	+26	-47
22 Tauri	6.5	3.30	17.6	24 19.1	12 35.9	+ 9 31.1	-0.3075	0.5322	0.1548	+28	-45
23 Tauri	4.3	3.29	17.7	23 44.4	12 44.2	+ 9 39.1	+0.3470	0.5323	0.1546	+66	-12
η Tauri	2.9	+3.29	+17.6	+23 53.9	13 16.5	+10 10.4	+0.2569	0.5327	+0.1535	+60	-16
104 B. Tauri	5.5	3.28	17.8	23 12.9	13 41.2	+10 34.2	+1.0653	0.5330	0.1527	+90	+29
27 Tauri	3.7	3.28	17.6	23 50.9	14 03.5	+10 55.8	+0.4303	0.5333	0.1519	+72	- 8
28 Tauri	5.2	3.28	17.5	23 55.9	14 04.2	+10 56.5	+0.3407	0.5333	0.1519	+66	-12
14 H. Tauri	5.3	3.31	17.0	25 22.6	14 34.6	+11 25.9	-1.1611	0.5337	0.1509	-28	-65
p Tauri	5.5	+3.28	+15.8	+26 18.4	23 59.5	- 3 28.2	-0.8422	0.5404	+0.1310	- 3	-64
x Tauri	5.3	3.24	15.4	25 28.3	2 05 17.7	+ 1 39.2	+0.7288	0.5442	0.1191	+90	+12
17 B. Aurigæ	6.0	3.21	12.8	27 47.2	18 33.0	- 9 33.5	-0.4092	0.5529	0.0871	+22	-44
38 B. Aurigæ	6.5	3.17	12.1	27 36.3	23 39.2	- 4 38.3	+0.1996	0.5559	0.0740	+57	-11
47 B. Aurigæ	6.0	3.16	11.7	27 56.9	3 01 50.0	- 2 32.3	-0.0161	0.5572	0.0683	+44	-21
354 B. Tauri	6.4	+3.12	+11.0	+27 53.5	06 36.3	+ 2 03.6	+0.3400	0.5598	+0.0555	+66	- 2
22 Aurigæ	6.4	3.14	10.5	28 52.5	07 36.0	+ 3 01.0	-0.6610	0.5603	0.0528	+ 7	-58
β Tauri	1.7	+3.12	+10.3	+28 33.2	08 49.8	+ 4 12.2	-0.2533	0.5609	+0.0495	+30	-32

Full Moon.—Sept. 26^d 19^h 44^m 9

OCTOBER.

THE STAR'S					AT CONJUNCTION IN R.A.					Limiting Parallels.	
Name.	Mag.	Reductions from 1931.0.		Apparent Declina- tion.	Greenwich Mean Time.	Hour Angle, H	Y	α'	β'	N.	S.
		$\Delta\alpha$	$\Delta\delta$								
17 B. Aurigæ	6.5	+3.07	+10.0	+27 37.3	8 12 52.9	+ 8 06.4	+0.9229	0.5628	+0.0383	+90	+31
16 B. Aurigæ	5.9	3.09	9.3	29 10.8	14 16.2	+ 9 26.4	-0.6940	0.5635	0.0344	+ 5	-59
16 B. Tauri	5.6	3.02	9.0	27 57.1	19 07.7	- 9 53.0	+0.7518	0.5655	0.0207	+90	+23
14 B. Aurigæ	6.4	3.02	8.2	28 56.1	21 25.6	- 7 40.2	-0.2574	0.5664	0.0141	+30	-29
13 B. Aurigæ	6.3	3.00	7.3	29 31.3	4 01 27.3	- 3 47.6	-0.8467	0.5678	+0.0025	- 5	-61
κ Aurigæ	4.4	+2.96	+ 6.5	+29 31.6	05 08.8	- 0 14.5	-0.8613	0.5688	-0.0083	- 6	-61
1 B. Aurigæ	6.3	2.94	6.3	29 34.6	07 31.2	+ 2 02.5	-0.9397	0.5694	0.0152	-12	-61
19 Aurigæ	5.1	2.84	5.8	28 04.7	13 14.6	+ 7 32.9	+0.5088	0.5706	0.0320	+80	+ 9
13 Aurigæ	5.6	2.85	5.2	29 02.8	14 31.5	+ 8 46.7	-0.5556	0.5708	0.0358	+13	-50
14 Aurigæ	5.8	2.82	5.4	28 19.6	15 00.5	+ 9 14.7	+0.1858	0.5709	0.0372	+56	- 8
18 Geminorum	5.5	+2.82	+ 4.8	+29 02.6	17 06.7	+11 16.0	-0.6542	0.5712	-0.0435	+ 7	-57
17 Geminorum	5.6	2.64	3.6	26 58.3	5 03 55.8	- 2 20.0	+0.8771	0.5717	0.0753	+90	+25
13 Geminorum	5.9	2.65	3.0	28 01.2	05 46.0	- 0 33.9	-0.3619	0.5717	0.0806	+24	-41
14 B. Geminorum	6.5	2.62	3.2	26 49.0	06 13.7	- 0 07.3	+0.8584	0.5716	0.0820	+90	+24
19 Geminorum	5.7	2.60	2.4	27 46.4	09 15.4	+ 2 47.5	-0.4030	0.5715	0.0908	+22	-44
ι Geminorum	3.8	+2.59	+ 2.2	+27 56.2	09 44.1	+ 3 15.0	-0.6173	0.5715	-0.0921	+10	-57
b^1 Geminorum	5.0	2.58	1.9	28 15.7	11 11.6	+ 4 39.1	-1.0927	0.5713	0.0964	-24	-62
b^2 Geminorum	5.0	2.58	2.0	28 03.6	11 23.3	+ 4 50.4	-0.9011	0.5713	0.0969	- 8	-62
v Geminorum	4.3	2.52	1.8	27 03.1	13 52.9	+ 7 14.3	-0.1004	0.5710	0.1040	+39	-28
c Geminorum	5.5	2.46	1.7	25 57.0	17 13.5	+10 27.2	+0.6787	0.5706	0.1135	+90	+11
ϕ Geminorum	4.9	+2.43	+ 0.7	+26 56.8	21 02.3	- 9 52.7	-0.8067	0.5699	-0.1242	- 1	-64
ω Cancrî	6.1	2.37	0.7	25 35.0	6 00 05.4	- 6 56.6	+0.2112	0.5692	0.1326	+57	-16
4 Cancrî	6.2	2.36	+ 0.8	25 16.9	00 25.3	- 6 37.4	+0.4792	0.5692	0.1335	+76	- 2
ψ Cancrî	5.9	2.32	- 0.2	25 43.1	03 59.6	- 3 11.2	-0.4659	0.5683	0.1432	+19	-52
λ Cancrî	5.9	2.24	0.1	24 14.4	08 09.3	+ 0 48.9	+0.4349	0.5672	0.1542	+73	- 6
8 Cancrî	6.1	+2.20	- 0.7	+24 22.5	11 29.4	+ 4 01.5	-0.2315	0.5662	-0.1629	+32	-41
v^1 Cancrî	5.7	2.18	0.9	24 18.9	12 41.5	+ 5 10.9	-0.3671	0.5658	0.1659	+25	-49
v^2 Cancrî	6.4	2.17	1.0	24 19.2	13 18.6	+ 5 46.6	-0.4758	0.5656	0.1675	+19	-55
θ H ¹ Cancrî	6.1	1.92	2.6	21 34.1	7 06 21.7	- 1 48.3	-0.8739	0.5597	0.2078	+ 4	-69
7 B. Leonis	6.3	1.59	4.0	16 05.6	8 04 49.2	- 4 09.3	-0.5313	0.5517	0.2508	+17	-67
4 Leonis	6.4	+1.53	- 3.8	+13 41.7	07 26.1	- 1 38.0	+1.2013	0.5508	-0.2550	+90	+28
7 Leonis	5.5	1.52	4.1	14 04.3	09 38.8	+ 0 30.2	+0.2569	0.5501	0.2584	+59	-27
1 Leonis	5.2	1.35	5.1	10 54.6	9 00 05.4	- 9 33.7	-0.4775	0.5464	0.2774	+20	-69
χ Leonis	4.6	1.24	5.2	7 42.5	07 09.4	- 2 44.2	+0.6994	0.5451	0.2845	+90	- 8
8 B. Leonis	5.8	1.24	5.8	8 26.2	11 11.2	+ 1 09.1	-1.1720	0.5445	0.2879	-21	-82
7 G. Libræ	6.1	+1.13	-13.0	-21 46.1	18 16 01.6	+ 2 24.1	+0.7305	0.5740	-0.2089	+69	- 5
4 G. Libræ	5.8	1.17	13.1	22 08.9	20 00.9	+ 6 14.2	+0.2956	0.5759	0.1994	+48	-29
3 B. Libræ	6.3	1.25	13.6	24 15.6	14 02 40.2	-11 22.1	+1.1324	0.5789	0.1825	+66	+24
9 B. Libræ	6.0	1.28	13.4	22 55.0	04 31.5	- 9 35.3	-0.5431	0.5797	0.1776	+ 3	-81
7 B. Libræ	6.2	1.28	13.3	22 55.8	05 08.3	- 8 59.9	-0.6399	0.5799	0.1760	- 2	-90
2 Libræ	5.0	+1.29	-13.5	-23 35.9	05 29.8	- 8 39.2	-0.0329	0.5800	-0.1750	+29	-47
b Scorpii	4.7	1.35	13.9	25 32.8	09 41.0	- 4 37.9	+1.2115	0.5816	0.1636	+65	+33
4 Scorpii	4.6	1.36	13.8	25 07.6	10 43.2	- 3 38.2	+0.6216	0.5819	0.1607	+62	-10
1 B. Scorpii	5.4	1.36	13.6	24 20.0	10 50.5	- 3 31.2	-0.1941	0.5820	0.1604	+19	-56
2 B. Scorpii	5.3	1.36	13.5	23 46.6	10 51.6	- 3 30.1	-0.7548	0.5820	0.1603	-11	-90
3 Scorpii	5.9	+1.37	-13.8	-25 02.7	11 07.8	- 3 14.5	+0.4739	0.5821	-0.1596	+54	-19
θ B. Scorpii	5.4	1.39	13.6	24 38.2	12 40.2	- 1 45.9	-0.1771	0.5826	0.1552	+19	-55
π Scorpii	3.0	1.39	14.0	25 55.3	12 45.7	- 1 40.6	+1.0988	0.5827	0.1549	+65	+22
8 B. Scorpii	4.9	1.41	13.9	25 40.7	14 31.2	+ 0 00.7	+0.5876	0.5832	0.1499	+59	-12
θ B. Scorpii	6.4	1.42	13.6	24 32.5	14 45.2	+ 0 14.1	-0.5911	0.5832	0.1493	- 3	-86
4 G. Scorpii	6.2	+1.44	-13.5	-24 17.0	16 17.8	+ 1 43.1	-1.0791	0.5837	-0.1448	-33	-90
5 B. Scorpii	5.5	+1.46	-13.9	-26 08.8	16 22.4	+ 1 47.5	+0.7870	0.5838	-0.1446	+64	0

Last Quarter—Oct. 4^d 20^h 15^m.1New Moon—Oct. 11^d 13^h 05^m.9

THE STAR'S					AT CONJUNCTION IN R.A.					Limiting Parallels	
Name.	Mag.	Reductions from 1931.0.		Apparent Declina- tion.	Greenwich Mean Time.	Hour Angle, H	Y	x'	y'	N.	S.
		$\Delta\alpha$	$\Delta\delta$								
85 B. Scorpii	6.0	+1.48	-13.6	-25 18.4	14 19 01.0	+ 4 19.7	-0.4313	0.5844	-0.1368	+ 5	-72
a Scorpii	3.0	1.52	13.6	25 26.0	21 27.4	+ 6 40.2	-0.6302	0.5850	0.1296	- 7	-90
a Sco. (<i>Antares</i>)	1.3	1.58	13.7	26 17.1	15 00 37.7	+ 9 42.9	-0.1654	0.5857	0.1201	+17	-55
116 B. Scorpii	6.2	1.59	13.7	26 23.6	01 23.4	+10 26.7	-0.1462	0.5858	0.1178	+17	-53
134 B. Scorpii	6.4	1.68	13.7	27 19.9	06 21.7	- 8 47.0	+0.2597	0.5864	0.1025	+37	-30
95 G. Ophiuchi	6.1	+1.87	-13.0	-27 40.9	17 11.4	+ 1 36.4	-0.3105	0.5865	-0.0685	+ 5	-64
43 Ophiuchi	5.4	1.95	12.8	28 04.9	21 24.0	+ 5 38.9	-0.1620	0.5861	0.0552	+11	-55
163 G. Ophiuchi	6.3	2.08	11.9	27 51.3	18 05 06.8	-10 57.2	-0.7276	0.5844	0.0306	-21	-90
X Sagitt. (<i>var.</i>)	4.4	2.11	11.7	27 48.6	06 46.2	- 9 21.8	-0.8228	0.5839	0.0254	-27	-90
10 G. Sagittarii	5.7	2.18	11.4	28 03.5	10 19.3	- 5 57.2	-0.6373	0.5828	0.0142	-17	-90
210 B. Scorpii	5.8	+2.20	-11.5	-28 45.4	11 04.6	- 5 13.7	+0.0756	0.5825	-0.0119	+19	-40
W Sagitt. (<i>var.</i>)	4.3	2.26	11.5	29 35.3	13 33.3	- 2 50.9	+0.9201	0.5815	0.0041	+61	+11
38 B. Sagittarii	4.7	2.26	11.0	28 28.2	14 46.2	- 1 41.0	-0.2447	0.5810	-0.0003	+ 2	-60
C. D. -28° 14268	6.4	2.30	10.9	28 55.3	16 17.4	- 0 13.3	+0.2281	0.5803	+0.0044	+27	-32
48 G. Sagittarii	6.3	2.33	10.6	28 18.9	18 26.0	+ 1 50.1	-0.3857	0.5793	0.0110	- 4	-70
62 B. Sagittarii	6.0	+2.34	-10.5	-28 40.8	18 26.2	+ 1 50.3	-0.0069	0.5793	+0.0110	+15	-45
58 G. Sagittarii	6.1	2.36	10.2	28 27.9	20 15.4	+ 3 35.2	-0.2048	0.5785	0.0165	+ 6	-57
7 Sagittarii	3.5	2.65	7.4	27 46.5	17 14 23.1	- 2 59.1	-0.1454	0.5671	0.0695	+13	-53
183 B. Sagittarii	6.2	2.68	7.5	28 44.8	14 36.4	- 2 46.3	+0.8962	0.5670	0.0701	+62	+ 8
234 B. Sagittarii	5.9	2.77	6.0	28 00.1	21 40.8	+ 4 02.3	-0.6753	0.5616	0.0892	+61	- 6
248 B. Sagittarii	5.7	+2.79	- 5.4	-27 07.8	23 57.1	+ 6 13.4	-0.0412	0.5598	+0.0951	+21	-47
ω Sagittarii	4.8	2.95	3.1	26 29.1	18 11 06.6	- 7 01.2	+0.4905	0.5506	0.1226	+53	-18
Δ Sagittarii	4.9	2.95	- 2.9	26 23.1	12 28.9	- 5 41.7	+0.5539	0.5495	0.1258	+56	-14
56 B. Capricorni	6.3	3.15	+ 1.6	24 01.6	19 07 08.4	-11 40.5	+0.7512	0.5333	0.1652	+66	- 3
χ Capricorni	5.3	3.20	4.5	21 28.2	20 42.0	+ 1 26.7	+0.3894	0.5219	0.1891	+54	-24
27 Capricorni	6.1	+3.20	+ 4.8	-20 50.0	21 11.1	+ 1 54.9	-0.2121	0.5215	+0.1898	+23	-57
φ Capricorni	5.3	3.22	5.3	20 56.3	20 00 10.0	+ 4 48.2	+0.4749	0.5192	0.1945	+60	-19
128 B. Capricorni	6.5	3.25	7.0	19 26.9	07 19.7	+11 44.7	+0.2821	0.5136	0.2050	+51	-30
δ Capricorni	2.9	3.26	9.2	16 26.3	16 01.8	- 3 48.9	-1.1759	0.5073	0.2165	-29	-90
152 B. Capricorni	6.5	3.28	9.4	17 09.9	17 40.5	- 2 13.1	-0.0218	0.5062	0.2185	+36	-46
39 Aquarii	6.2	+3.31	+12.0	-14 31.9	21 05 23.1	+ 9 09.1	-0.2801	0.4988	+0.2313	+26	-61
42 Aquarii	5.5	3.30	12.8	13 10.4	07 44.2	+11 26.2	-1.2289	0.4975	0.2337	-31	-90
45 Aquarii	6.1	3.32	12.8	13 38.8	08 55.2	-11 24.8	-0.4293	0.4968	0.2347	+18	-70
50 Aquarii	5.9	3.35	13.2	13 52.6	11 51.5	- 8 33.5	+0.5164	0.4952	0.2374	+70	-18
182 B. Aquarii	6.2	3.36	13.7	13 15.9	14 53.4	- 5 36.7	+0.5672	0.4937	0.2400	+73	-15
70 Aquarii	6.1	+3.37	+15.7	-10 55.0	22 01 05.6	+ 4 18.8	+0.4630	0.4890	+0.2477	+68	-21
h Aquarii	5.4	3.38	17.6	8 03.7	10 26.4	-10 35.6	-0.3532	0.4857	0.2533	+26	-65
φ Aquarii	4.6	3.37	18.4	6 25.0	15 38.2	- 5 32.1	-0.8533	0.4841	0.2558	0	-90
χ Aquarii	5.3	3.41	18.2	8 05.9	17 04.3	+ 4 08.3	+1.3783	0.4837	0.2565	+79	+42
96 Aquarii	5.7	3.38	19.0	5 29.8	18 31.3	- 2 43.7	-1.1335	0.4833	0.2571	-18	-90
317 B. Aquarii	6.3	+3.38	+18.9	- 6 16.8	19 15.9	- 2 00.2	-0.0738	0.4832	+0.2574	+40	-49
337 B. Aquarii	6.4	3.40	19.6	4 54.2	23 00 19.1	+ 2 55.0	-0.2952	0.4822	0.2592	+29	-61
342 B. Aquarii	6.5	3.40	19.8	4 27.5	01 27.7	+ 4 01.7	-0.4916	0.4819	0.2596	+19	-74
20 Piscium	5.6	3.43	21.1	3 08.4	10 55.0	-10 45.9	+0.5093	0.4808	0.2618	+75	-19
80 B. Piscium	6.3	3.45	22.2	0 52.8	20 48.6	- 1 07.8	+0.5969	0.4804	0.2628	+83	-15
98 B. Piscium	6.3	+3.46	+23.1	+ 1 18.7	24 04 09.8	+ 6 01.9	+0.0948	0.4808	+0.2627	+50	-41
44 Piscium	6.1	3.47	23.4	1 33.8	08 33.5	+10 18.7	+0.9678	0.4812	0.2622	+90	+ 6
60 Piscium	6.2	3.50	24.6	6 22.3	21 10.3	- 1 24.4	-1.0804	0.4836	0.2593	-14	-84
147 B. Piscium	5.9	3.55	23.5	4 56.0	21 42.4	- 0 53.1	+0.6561	0.4837	0.2591	+87	-11
171 B. Piscium	6.3	3.54	24.8	6 07.1	25 04 14.9	+ 5 29.0	+1.0271	0.4855	0.2566	+90	+11
ε Piscium	4.4	+3.53	+25.0	+ 7 31.6	06 00.7	+ 7 12.0	-0.0835	0.4859	+0.2559	+40	-48
π Piscium	5.6	+3.61	+25.4	+11 47.8	28 01 02.1	+ 1 42.4	-0.0518	0.4935	+0.2443	+42	-44

First Quarter—Oct. 18^d 09^h 20^m.0Full Moon—Oct. 26^d 13^h 33^m.9

OCTOBER.

THE STAR'S					AT CONJUNCTION IN R.A.					Limiting Parallels.	
Name.	Mag.	Reductions from 1931.0.		Apparent Declina- tion.	Greenwich Mean Time.	Hour Angle, H	Y	x'	y'	N.	S.
		$\Delta\alpha$	$\Delta\delta$								
19 Arietis	5.8	+3.71	+24.9	+14 57.8	26 20 20.7	- 3 31.7	+0.9953	0.5038	+0.2262	+90	+15
27 Arietis	6.4	3.76	24.2	17 24.4	27 05 37.0	+ 5 28.4	+0.3409	0.5096	0.2152	+65	-20
μ Arietis	5.7	3.80	23.8	19 43.5	11 26.7	+11 07.7	-0.9763	0.5134	0.2074	-10	-71
47 Arietis	5.8	3.84	23.1	20 24.0	19 18.7	- 5 14.7	-0.1309	0.5188	0.1958	+38	-42
ϵ Arietis	4.6	3.84	23.0	21 04.3	19 52.3	- 4 42.1	-0.7601	0.5192	0.1950	+4	-69
ζ Arietis	4.8	+3.86	+22.2	+20 47.8	28 03 33.9	+ 2 45.0	+0.9950	0.5246	+0.1824	+90	+21
66 Arietis	6.1	3.90	21.2	22 34.4	10 03.2	+ 9 01.9	+0.1921	0.5292	0.1709	+56	-22
7 Tauri	5.9	3.94	20.8	24 14.4	12 52.9	+11 46.1	-1.1569	0.5312	0.1656	-27	-66
16 Tauri	5.4	3.94	20.1	24 04.8	17 44.9	- 7 31.5	-0.1972	0.5346	0.1561	+34	-39
17 Tauri	3.8	3.94	20.1	23 54.2	17 47.0	- 7 29.4	+0.0008	0.5346	0.1561	+45	-29
18 Tauri	5.6	+3.95	+20.0	+24 37.8	17 54.5	- 7 22.2	-0.7740	0.5348	+0.1558	+1	-66
η Tauri	4.3	3.94	20.1	24 15.5	17 56.1	- 7 20.7	-0.3634	0.5348	0.1558	+25	-48
20 Tauri	4.1	3.94	20.0	24 09.5	18 13.5	- 7 03.8	-0.2103	0.5350	0.1552	+33	-40
21 Tauri	5.8	3.95	20.0	24 20.8	18 15.6	- 7 01.8	-0.4092	0.5350	0.1551	+22	-51
22 Tauri	6.5	3.95	20.0	24 19.2	18 19.5	- 6 58.0	-0.3701	0.5351	0.1550	+25	-49
23 Tauri	4.3	+3.94	+20.1	+23 44.4	18 27.7	- 6 50.0	+0.2844	0.5351	+0.1547	+62	-15
η Tauri	2.9	3.94	20.0	23 53.9	19 00.0	- 6 18.9	+0.1940	0.5355	0.1536	+56	-20
104 B. Tauri	5.5	3.93	20.0	23 13.0	19 24.5	- 5 55.1	+1.0023	0.5358	0.1528	+90	+25
27 Tauri	3.7	3.94	19.8	23 51.0	19 46.8	- 5 33.6	+0.3670	0.5360	0.1520	+67	-11
28 Tauri	5.2	3.94	19.8	23 56.0	19 47.4	- 5 32.9	+0.2774	0.5361	0.1520	+61	-15
ρ Tauri	5.5	+4.00	+18.0	+26 18.4	29 05 40.5	+ 4 00.1	-0.9120	0.5428	+0.1310	-8	-64
χ Tauri	5.3	3.98	17.3	25 28.4	10 57.9	+ 9 06.7	+0.6580	0.5463	0.1189	+90	+8
17 B. Aurigæ	6.0	4.02	14.4	27 47.3	30 00 12.8	- 2 06.3	-0.4891	0.5542	0.0867	+17	-49
38 B. Aurigæ	6.5	4.00	13.4	27 36.3	05 19.5	+ 2 49.4	+0.1189	0.5569	0.0735	+52	-15
47 B. Aurigæ	6.0	4.00	12.9	27 56.9	07 30.6	+ 4 55.7	-0.0986	0.5579	0.0678	+39	-26
354 B. Tauri	6.4	+3.98	+11.9	+27 53.5	12 18.0	+ 9 32.7	+0.2566	0.5601	+0.0550	+61	-7
22 Aurigæ	6.4	4.01	11.4	28 52.5	13 17.9	+10 30.4	-0.7499	0.5605	0.0523	+1	-62
β Tauri	1.7	4.00	11.2	28 33.2	14 32.0	+11 41.8	-0.3402	0.5611	0.0489	+25	-37
107 B. Aurigæ	6.5	3.95	10.6	27 37.3	18 36.5	- 8 22.7	+0.8397	0.5626	0.0377	+90	+26
116 B. Aurigæ	5.9	3.99	10.0	29 10.8	20 00.3	- 7 02.0	-0.7860	0.5631	0.0339	-1	-61
406 B. Tauri	5.6	+3.92	+9.2	+27 57.1	31 00 54.0	- 2 19.3	+0.6655	0.5646	+0.0202	+90	+18
136 Tauri	4.6	3.91	9.1	27 36.0	01 53.3	- 1 22.2	+1.0607	0.5649	0.0174	+90	+42
154 B. Aurigæ	6.4	3.94	8.4	28 56.1	03 13.0	- 0 05.4	-0.3506	0.5652	0.0136	+25	-34
415 B. Tauri	6.1	3.88	8.4	27 34.4	05 05.1	+ 1 42.5	+1.1296	0.5657	0.0083	+90	+48
183 B. Aurigæ	6.3	3.93	7.3	29 31.3	07 17.0	+ 3 49.5	-0.9456	0.5662	+0.0020	-12	-61
κ Aurigæ	4.4	+3.90	+6.3	+29 31.6	11 01.0	+ 7 25.1	-0.9623	0.5668	-0.0087	-14	-61
211 B. Aurigæ	6.3	3.89	5.9	29 34.5	13 25.1	+ 9 43.7	-1.0425	0.5672	0.0156	-20	-61
49 Aurigæ	5.1	3.78	5.0	28 04.7	19 13.1	- 8 41.3	+0.4149	0.5676	0.0323	+72	+4
53 Aurigæ	5.6	3.80	4.4	29 02.8	20 31.1	- 7 26.3	-0.6588	0.5677	0.0360	+7	-57
54 Aurigæ	5.8	+3.78	+4.5	+28 19.6	21 00.5	- 6 58.1	+0.0886	0.5677	-0.0374	+50	-13
28 Geminorum	5.5	+3.78	+3.8	+29 02.6	23 08.7	- 4 54.7	-0.7595	0.5677	-0.0436	+1	-61

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47 Geminorum	5.6	+3.60	+1.9	+26 58.3	1 10 09.3	+ 5 41.1	+0.7829	0.5670	-0.0750	+90	+19
53 Geminorum	5.9	3.61	1.2	28 01.2	12 01.8	+ 7 29.4	-0.4696	0.5668	0.0802	+18	-47
134 B. Geminorum	6.5	3.57	1.4	26 48.9	12 30.0	+ 7 56.6	+0.7636	0.5667	0.0816	+90	+18
59 Geminorum	5.7	3.56	0.5	27 46.4	15 35.6	+10 55.2	-0.5123	0.5661	0.0902	+16	-51
ι Geminorum	3.8	3.56	+0.2	27 56.2	16 04.8	+11 23.2	-0.7293	0.5660	0.0915	+3	-63
δ Geminorum	5.0	+3.54	-0.2	+28 03.6	17 46.2	-10 59.2	-1.0169	0.5657	-0.0962	-17	-62
ν Geminorum	4.3	3.48	0.5	27 03.0	20 19.3	- 8 31.8	-0.2079	0.5651	0.1032	+33	-34
ϵ Geminorum	5.5	3.41	0.8	25 57.0	23 44.7	- 5 14.1	+0.5799	0.5642	0.1125	+86	+5
ϕ Geminorum	4.9	+3.39	-2.0	+26 56.7	2 03 39.2	- 1 28.3	-0.9249	0.5631	-0.1229	-9	-64

Full Moon—Oct. 26^d 13^h 33^m.9

THE STAR'S					AT CONJUNCTION IN R.A.					Limiting Parallels.	
Name.	Mag.	Reductions from 1931.0.		Apparent Declina- tion.	Greenwich Mean Time.	Hour Angle, H	Y	π'	y'	N.	S.
		$\Delta\alpha$	$\Delta\delta$								
ω Cancr	6.1	+3.37	-2.1	+25 34.9	d h m 2 06 47.1	+ 1 32.6	+0.1054	0.5622	-0.1311	+51	-21
4 Cancr	6.2	3.30	2.1	25 16.8	07 07.5	+ 1 52.3	+0.3768	0.5620	0.1320	+68	-7
ψ Cancr	5.9	3.25	3.3	25 43.0	10 47.7	+ 5 24.3	-0.5817	0.5608	0.1414	+13	-59
λ Cancr	5.9	3.16	3.4	24 14.4	15 04.6	+ 9 31.8	+0.3310	0.5593	0.1522	+65	-12
28 Cancr	6.1	3.12	4.2	24 22.4	18 30.7	-11 09.7	-0.3454	0.5580	0.1605	+26	-47
ν^1 Cancr	5.7	+3.10	-4.4	+24 18.8	19 45.0	- 9 58.1	-0.4831	0.5575	-0.1635	+18	-55
ν^2 Cancr	6.4	3.09	4.6	24 19.2	20 23.2	- 9 21.3	-0.5935	0.5572	0.1650	+12	-61
90 H ¹ Cancr	6.1	2.78	6.8	21 34.0	8 13 59.9	+ 7 37.7	-0.9988	0.5500	0.2040	-12	-69
107 B. Leonis	6.3	2.35	8.6	16 05.5	4 13 16.1	+ 6 05.5	-0.6460	0.5412	0.2457	+11	-73
34 Leonis	6.4	2.28	8.2	13 41.7	15 58.9	+ 8 42.6	+1.1171	0.5404	0.2497	+90	+22
37 Leonis	5.5	+2.25	-8.7	+14 04.2	18 16.6	+10 55.7	+0.1576	0.5397	-0.2530	+53	-32
l Leonis	5.2	2.02	9.6	10 54.5	5 09 15.0	+ 1 23.8	-0.5808	0.5362	0.2715	+15	-76
χ Leonis	4.6	1.88	9.5	7 42.4	16 34.1	+ 8 28.3	-0.6205	0.5353	0.2786	+85	-11
σ Leonis	4.2	1.80	9.9	6 24.3	6 00 02.9	- 8 17.7	-0.1834	0.5348	0.2844	+35	-54
89 Leonis	5.7	1.70	9.8	3 26.5	06 12.4	- 2 20.5	+1.0111	0.5348	0.2881	+90	+10
β Virginis	3.8	+1.67	-10.4	+2 09.0	13 45.4	+ 4 57.7	+0.1051	0.5355	-0.2913	+50	-40
27 B. Virginis	6.5	1.58	10.2	+0 54.7	17 39.7	+ 8 44.0	+0.1965	0.5361	0.2924	+55	-35
13 Virginis	5.9	1.50	10.7	-0 24.4	7 02 42.5	- 6 31.3	-1.1458	0.5380	0.2932	-18	-90
200 B. Virginis	6.3	1.41	10.2	4 40.5	08 39.1	- 0 46.7	+1.3357	0.5398	0.2924	+83	+36
319 B. Virginis	6.3	1.36	10.6	5 55.6	15 52.9	+ 6 12.5	+0.4646	0.5424	0.2901	+71	-21
95 G. Ophiuchi	6.1	+1.66	-11.7	-27 40.9	12 03 17.4	-10 29.6	-0.2050	0.5956	-0.0685	+10	-57
43 G. Ophiuchi	5.4	1.72	11.5	28 04.9	07 23.6	- 6 33.6	-0.0537	0.5954	0.0550	+16	-48
163 G. Ophiuchi	6.3	1.82	10.8	27 51.3	14 54.0	+ 0 38.0	-0.6044	0.5940	0.0302	-14	-90
X Sagitt. (var.)	4.4	1.84	10.7	27 48.5	16 30.7	+ 2 10.8	-0.6968	0.5936	0.0249	-20	-90
10 G. Sagittarii	5.7	1.89	10.4	28 03.5	19 57.9	+ 5 29.4	-0.5099	0.5925	0.0136	-11	-80
210 B. Scorpii	5.8	+1.91	-10.5	-28 45.3	20 42.0	+ 6 11.7	+0.1948	0.5922	-0.0112	+26	-34
W Sagitt. (var.)	4.3	1.95	10.4	29 35.3	23 06.5	+ 8 30.4	+1.0309	0.5913	-0.0033	+61	+19
38 B. Sagittarii	4.7	1.96	10.0	28 28.1	18 00 17.4	+ 9 38.3	-0.1179	0.5908	+0.0005	+8	-52
C. D. -28° 14268	6.4	1.98	10.0	28 55.2	01 46.1	+11 03.4	+0.3503	0.5901	0.0053	+34	-25
48 G. Sagittarii	6.3	2.01	9.8	28 18.9	03 51.0	-10 56.9	-0.2536	0.5891	0.0120	+3	-60
62 B. Sagittarii	6.0	+2.01	-9.7	-28 40.7	03 51.2	-10 56.7	+0.1203	0.5891	+0.0120	+21	-38
58 G. Sagittarii	6.1	2.03	9.4	28 27.9	05 37.3	- 9 14.9	-0.0733	0.5882	0.0177	+12	-49
τ Sagittarii	3.5	2.26	7.2	27 46.5	23 14.6	+ 7 40.3	+0.0012	0.5763	0.0713	+21	-45
183 B. Sagittarii	6.2	2.29	7.2	28 44.8	23 27.5	+ 7 52.8	+1.0294	0.5762	0.0719	+62	+19
234 B. Sagittarii	5.9	2.37	6.0	28 00.1	14 06 20.3	- 9 30.4	-0.8173	0.5704	0.0912	+62	+3
248 B. Sagittarii	5.7	+2.38	-5.4	-27 07.8	08 33.0	- 7 22.7	+0.1118	0.5685	+0.0971	+29	-38
ω Sagittarii	4.8	2.53	3.5	26 29.1	19 25.2	+ 3 05.2	+0.6451	0.5584	0.1248	+62	-9
A Sagittarii	4.9	2.54	-3.3	26 23.1	20 45.4	+ 4 22.5	+0.7087	0.5572	0.1280	+64	-5
56 B. Capricorni	6.3	2.74	+0.7	24 01.6	15 14 59.2	- 2 01.9	+0.9157	0.5394	0.1673	+66	+7
17 Capricorni	5.8	2.69	+1.4	21 45.9	17 46.0	+ 0 39.2	-1.0309	0.5366	0.1725	-25	-90
χ Capricorni	5.3	+2.80	+3.2	-21 28.3	16 04 17.0	+10 49.4	+0.5644	0.5267	+0.1908	+64	-14
27 Capricorni	6.1	2.80	3.4	20 50.0	04 45.6	+11 17.1	-0.0311	0.5263	0.1916	+32	-46
ϕ Capricorni	5.3	2.83	3.9	20 56.3	07 41.4	- 9 52.7	+0.6503	0.5236	0.1962	+69	-10
128 B. Capricorni	6.5	2.87	5.5	19 26.9	14 44.2	- 3 03.2	+0.4614	0.5174	0.2065	+61	-20
7 Capricorni	3.7	2.88	7.1	16 58.4	19 47.8	+ 1 51.2	-1.1604	0.5132	0.2132	-28	-90
δ Capricorni	2.9	+2.90	+7.5	-16 26.4	23 10.0	+ 5 15.9	-0.9833	0.5103	+0.2176	-15	-90
152 B. Capricorni	6.5	2.92	7.7	17 10.0	17 00 56.5	+ 6 50.6	+0.1617	0.5090	0.2195	+46	-36
ι Aquarii	4.4	2.94	9.9	14 12.1	09 22.0	- 8 58.9	-1.1802	0.5028	0.2287	-28	-90
39 Aquarii	6.2	2.98	10.2	14 31.9	12 31.3	- 5 55.0	-0.0950	0.5007	0.2319	+35	-50
42 Aquarii	5.5	2.97	11.0	13 10.4	14 51.1	- 3 39.3	-1.0382	0.4992	0.2340	-16	-90
45 Aquarii	6.1	+2.99	+11.0	-13 38.9	16 01.4	- 2 31.0	-0.2439	0.4984	+0.2351	+28	-58
50 Aquarii	5.9	+3.02	+11.3	-13 52.6	18 56.2	+ 0 18.9	+0.6954	0.4966	+0.2376	+78	-9

Last Quarter—Nov. 3^d 07^h 17^m.5New Moon—Nov. 9^d 22^h 55^m.4First Quarter—Nov. 17^d 02^h 13^m.4

ELEMENTS OF OCCULTATIONS, 1931.

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NOVEMBER.

THE STAR'S					AT CONJUNCTION IN R.A.					Limiting Parallels.	
Name.	Mag.	Reductions from 1931.0.		Apparent Declina- tion.	Greenwich Mean Time.	Hour Angle, H	Y	x'	y'	N.	S.
		$\Delta\alpha$	$\Delta\delta$								
82 B. Aquarii	6.2	+3.05	+11.9	-13 16.0	17 21 56.7	+ 3 14.3	+0.7452	0.4948	+0.2401	+77	- 6
58 Aquarii	6.4	3.01	12.7	11 15.4	22 51.7	+ 4 07.8	-1.2391	0.4943	0.2408	-30	-90
70 Aquarii	6.1	3.08	14.0	10 55.0	18 08 05.0	-10 54.3	+0.6386	0.4895	0.2473	+79	-12
h Aquarii	5.4	3.12	16.0	8 03.7	17 23.3	- 1 51.1	-0.1787	0.4856	0.2525	+33	-55
φ Aquarii	4.6	3.13	16.8	6 25.0	22 34.1	+ 3 11.3	-0.6805	0.4839	0.2549	+9	-90
96 Aquarii	5.7	+3.15	+17.6	- 5 29.8	19 01 26.7	+ 5 59.2	-0.9618	0.4831	+0.2560	- 7	-90
17 B. Aquarii	6.3	3.15	17.4	6 16.8	02 11.2	+ 6 42.6	+0.0936	0.4829	0.2563	+49	-40
37 B. Aquarii	6.4	3.19	18.1	4 54.2	07 13.8	+11 37.2	-0.1310	0.4816	0.2580	+37	-52
42 B. Aquarii	6.5	3.19	18.4	4 27.6	08 22.3	-11 16.1	-0.3278	0.4814	0.2583	+27	-63
20 Piscium	5.6	3.25	19.8	3 08.4	17 48.9	- 2 14.4	+0.6616	0.4799	0.2603	+84	-11
30 B. Piscium	6.3	+3.30	+21.1	- 0 52.8	20 03 42.3	+ 7 33.5	+0.7385	0.4795	+0.2612	+90	- 7
98 B. Piscium	6.3	3.34	22.2	+ 1 18.7	11 03.5	- 9 16.8	+0.2286	0.4798	0.2609	+57	-34
Piscium	6.1	3.37	22.5	1 33.8	15 27.2	- 5 00.0	+1.0944	0.4803	0.2604	+90	+15
50 Piscium	6.2	3.44	24.4	6 22.3	21 04 03.9	+ 7 16.9	-0.9678	0.4827	0.2575	- 6	-84
47 B. Piscium	5.9	3.50	23.0	4 56.0	04 36.1	+ 7 48.2	+0.7651	0.4829	0.2573	+90	- 5
71 B. Piscium	6.3	+3.50	+24.5	+ 6 07.1	11 08.4	- 9 50.0	+1.1257	0.4849	+0.2549	+90	+18
ε Piscium	4.4	3.51	24.8	7 31.6	12 54.1	- 8 07.1	+0.0142	0.4854	0.2541	+46	-43
π Piscium	5.6	3.67	25.8	11 47.8	22 07 53.7	+10 21.6	+0.0146	0.4936	0.2427	+46	-40
19 Arietis	5.8	3.86	25.7	14 57.9	23 03 07.9	+ 5 03.0	+1.0253	0.5050	0.2250	+90	+17
27 Arietis	6.4	3.96	25.4	17 24.4	12 21.0	-10 00.1	+0.3619	0.5112	0.2141	+66	-19
μ Arietis	5.7	+4.04	+25.2	+19 43.5	18 08.3	- 4 23.2	-0.9675	0.5154	+0.2064	- 9	-71
47 Arietis	5.8	4.13	24.6	20 24.0	24 01 56.6	+ 3 10.7	-0.1387	0.5212	0.1950	+37	-42
ε Arietis	4.6	4.13	24.6	21 04.3	02 30.0	+ 3 43.1	-0.7667	0.5217	0.1941	+ 3	-69
ζ Arietis	4.8	4.19	23.6	20 47.8	10 07.5	+11 06.3	+0.9683	0.5276	0.1816	+90	+19
56 Arietis	6.1	4.28	22.8	22 34.4	16 33.1	- 6 40.7	+0.1571	0.5326	0.1701	+54	-24
7 Tauri	5.9	+4.34	+22.6	+24 14.4	19 21.0	- 3 58.2	-1.1914	0.5347	+0.1649	-30	-66
16 Tauri	5.4	4.37	21.8	24 04.8	25 00 09.9	+ 0 41.0	-0.2439	0.5384	0.1554	+31	-42
17 Tauri	3.8	4.37	21.8	23 54.2	00 12.0	+ 0 43.1	-0.0469	0.5384	0.1554	+42	-32
18 Tauri	5.6	4.38	21.8	24 37.8	00 19.4	+ 0 50.3	-0.8186	0.5385	0.1551	- 1	-66
9 Tauri	4.3	4.38	21.8	24 15.5	00 21.0	+ 0 51.8	-0.4098	0.5385	0.1550	+22	-51
20 Tauri	4.1	+4.38	+21.7	+24 09.6	00 38.2	+ 1 08.4	-0.2577	0.5388	+0.1545	+31	-43
21 Tauri	5.8	4.38	21.7	24 20.8	00 40.3	+ 1 10.4	-0.4559	0.5388	0.1544	+20	-54
22 Tauri	6.5	4.38	21.7	24 19.2	00 44.2	+ 1 14.2	-0.4170	0.5388	0.1543	+22	-51
23 Tauri	4.3	4.37	21.7	23 44.4	00 52.3	+ 1 22.0	+0.2344	0.5389	0.1540	+59	-18
7 Tauri	2.9	4.38	21.6	23 53.9	01 24.2	+ 1 52.8	+0.1435	0.5394	0.1529	+53	-22
34 B. Tauri	5.5	+4.36	+21.5	+23 13.0	01 48.4	+ 2 16.3	+0.9477	0.5397	+0.1521	+90	+21
27 Tauri	3.7	4.38	21.5	23 51.0	02 10.4	+ 2 37.6	+0.3144	0.5400	0.1513	+64	-14
28 Tauri	5.2	4.38	21.5	23 56.0	02 11.0	+ 2 38.1	+0.2251	0.5400	0.1513	+58	-18
φ Tauri	5.5	4.51	19.7	26 18.5	11 57.4	-11 55.4	-0.9756	0.5472	0.1302	-13	-64
χ Tauri	5.3	4.52	18.7	25 28.4	17 11.0	- 6 52.8	+0.5788	0.5508	0.1182	+85	+ 4
17 B. Aurigæ	6.0	+4.65	+15.8	+27 47.3	28 06 16.3	+ 5 44.5	-0.5846	0.5590	+0.0858	+12	-55
38 B. Aurigæ	6.5	4.66	14.5	27 36.3	11 19.3	+10 36.6	+0.0129	0.5618	0.0725	+46	-20
47 B. Aurigæ	6.0	4.68	14.0	27 57.0	13 28.9	-11 18.6	-0.2071	0.5629	0.0668	+33	-31
54 B. Tauri	6.4	4.68	12.9	27 53.6	18 12.8	- 6 45.1	+0.1395	0.5650	0.0538	+53	-12
22 Aurigæ	6.4	4.73	12.5	28 52.6	19 12.1	- 5 48.0	-0.8045	0.5654	0.0511	- 6	-62
β Tauri	1.7	+4.72	+12.1	+28 33.3	20 25.3	- 4 37.4	-0.4583	0.5659	+0.0477	+19	-44
07 B. Aurigæ	6.5	4.68	11.2	27 37.3	27 00 27.0	- 0 44.7	+0.7110	0.5675	0.0365	+90	+19
16 B. Aurigæ	5.9	4.74	10.7	29 10.8	01 49.9	+ 0 35.0	-0.9108	0.5679	0.0326	+10	-61
06 B. Tauri	5.6	4.69	9.6	27 57.1	06 40.4	+ 5 14.6	+0.5284	0.5693	0.0188	+82	+11
36 Tauri	4.6	4.68	9.4	27 36.0	07 39.1	+ 6 11.1	+0.9210	0.5696	0.0159	+90	+33
54 B. Aurigæ	6.4	+4.73	+ 8.8	+28 56.1	08 58.0	+ 7 27.0	-0.4876	0.5699	+0.0122	+17	-43
15 B. Tauri	6.1	+4.67	+ 8.5	+27 34.4	10 49.0	+ 9 13.8	+0.9852	0.5703	+0.0068	+90	+38

First Quarter—Nov. 17^d 02^h 13^m.4Full Moon—Nov. 25^d 07^h 09^m.9

THE STAR'S					AT CONJUNCTION IN R.A.					Limiting Parallels.	
Name.	Mag.	Reductions from 1931 ^o .		Apparent Declina- tion.	Greenwich Mean Time.	Hour Angle, <i>H</i>	<i>Y</i>	<i>z'</i>	<i>y'</i>	<i>N.</i>	<i>S.</i>
		$\Delta\alpha$	$\Delta\delta$								
183 B. Aurigæ	6.3	+4.74	+7.6	+29 31.3	27 12 59.6	+11 19.5	-1.0868	0.5707	+0.0005	-24	-61
κ Aurigæ	4.4	4.73	6.3	29 31.6	16 41.5	-9 07.1	-1.1089	0.5712	-0.0102	-27	-61
49 Aurigæ	5.1	4.64	4.5	28 04.7	28 00 49.5	-1 17.6	+0.2534	0.5716	0.0339	+60	-4
53 Aurigæ	5.6	4.68	3.9	29 02.8	02 06.9	-0 03.2	-0.8200	0.5716	0.0377	-3	-61
54 Aurigæ	5.8	4.64	3.9	28 19.6	02 36.2	+0 25.0	-0.0746	0.5715	0.0391	+40	-22
28 Geminorum	5.5	+4.66	+3.2	+29 02.6	04 43.5	+2 27.5	-0.9242	0.5714	-0.0452	-11	-61
47 Geminorum	5.6	4.51	+0.4	26 58.3	15 40.6	-11 00.3	+0.6023	0.5699	0.0766	+89	+9
53 Geminorum	5.9	4.53	-0.2	28 01.1	17 32.6	-9 12.5	-0.6522	0.5694	0.0819	+8	-59
134 B. Geminorum	6.5	4.49	0.2	26 48.9	18 00.7	-8 45.5	+0.5802	0.5693	0.0831	+86	+8
59 Geminorum	5.7	4.49	1.2	27 46.4	21 05.8	-5 47.3	-0.6997	0.5685	0.0917	+5	-62
ι Geminorum	3.8	+4.49	-1.4	+27 56.2	21 35.0	-5 19.3	-0.9173	0.5684	-0.0931	-10	-63
υ Geminorum	4.3	4.42	2.4	27 03.0	29 01 49.0	-1 14.7	-0.4010	0.5670	0.1047	+22	-45
ν Geminorum	5.5	4.35	3.0	25 56.9	05 14.3	+2 02.9	+0.3836	0.5658	0.1139	+69	-5
φ Geminorum	4.9	4.34	4.3	26 56.7	09 09.0	+5 48.8	-1.1282	0.5643	0.1242	-26	-64
ω Cancrī	6.1	4.26	4.8	25 34.9	12 17.2	+8 50.1	-0.0996	0.5630	0.1323	+39	-31
4 Cancrī	6.2	+4.25	-4.8	+25 16.8	12 37.7	+9 10.0	+0.1721	0.5628	-0.1332	+55	-18
ψ Cancrī	5.9	4.22	6.2	25 43.0	16 18.6	-11 17.4	-0.7928	0.5612	0.1425	0	-65
λ Cancrī	5.9	4.12	6.6	24 14.3	20 36.7	-7 08.7	+0.1181	0.5592	0.1530	+52	-22
28 Cancrī	6.1	4.08	7.5	24 22.4	30 00 04.0	-3 49.0	-0.5642	0.5575	0.1612	+14	-60
υ ¹ Cancrī	5.7	4.06	7.8	24 18.8	01 18.8	-2 36.9	-0.7039	0.5568	0.1641	+6	-66
υ ² Cancrī	6.4	+4.06	-8.0	+24 19.1	01 57.3	-1 59.8	-0.8154	0.5565	-0.1656	-1	-66
γ Cancrī	4.7	+3.91	-8.2	+21 42.9	06 25.7	+2 19.0	+1.1345	0.5542	-0.1757	+90	+33

DECEMBER.

107 B. Leonis	6.3	+3.27	-13.8	+16 05.4	1 19 27.3	-9 55.9	-0.8979	0.5356	-0.2431	-4	-74
34 Leonis	6.4	3.19	13.5	13 41.6	22 13.8	-7 14.9	+0.8847	0.5345	0.2470	+90	+6
37 Leonis	5.5	3.16	14.0	14 04.2	2 00 34.8	+4 58.6	-0.0859	0.5336	0.2500	+40	-44
l Leonis	5.2	2.91	15.2	10 54.4	15 57.3	+9 53.7	-0.8323	0.5287	0.2673	+1	-80
χ Leonis	4.6	2.74	15.0	7 42.3	23 29.6	-6 48.5	+0.3895	0.5271	0.2737	+67	-23
σ Leonis	4.2	+2.64	-15.4	+6 24.2	8 07 12.6	+0 39.6	-0.4213	0.5262	-0.2790	+23	-68
80 Leonis	6.4	2.59	15.0	4 14.2	09 28.2	+2 50.9	+1.1456	0.5260	0.2803	+90	+19
89 Leonis	5.7	2.52	15.2	3 26.4	13 34.3	+6 49.0	+0.7976	0.5259	0.2823	+90	-3
β Virginis	3.8	2.48	15.7	2 09.0	21 22.7	-9 37.5	-0.1146	0.5262	0.2851	+39	-50
27 B. Virginis	6.5	2.37	15.4	+0 54.6	4 01 25.1	-5 42.9	-0.0168	0.5266	0.2860	+44	-45
162 B. Virginis	6.2	+2.18	-14.8	-4 14.3	15 08.6	+7 34.1	+1.2356	0.5296	-0.2860	+86	+26
200 B. Virginis	6.3	2.17	14.8	4 40.6	16 55.9	+9 18.0	+1.1644	0.5302	0.2856	+86	+20
f Virginis	6.0	2.14	14.8	5 27.4	19 21.5	+11 38.8	+1.2549	0.5310	0.2850	+85	+28
319 B. Virginis	6.3	2.09	15.0	5 55.7	5 00 24.8	-7 27.8	+0.2918	0.5329	0.2833	+60	-30
g Virginis	5.6	1.99	14.8	8 37.2	10 09.1	+1 57.1	+0.2535	0.5374	0.2780	+56	-32
a Virg. (Spica)	1.2	+1.92	-14.5	-10 48.3	17 45.1	+9 17.7	+0.3502	0.5416	-0.2720	+62	-27
550 B. Virginis	6.0	1.89	14.1	12 51.9	22 01.3	-10 34.8	+1.2561	0.5442	0.2680	+78	+29
86 Virginis	5.6	1.86	14.5	12 05.1	6 03 03.4	-5 43.1	-0.8589	0.5475	0.2625	-3	-90
621 B. Virginis	6.4	1.80	14.2	14 38.7	11 11.0	+2 07.4	+0.3931	0.5532	0.2520	+19	-68
214 G. Virginis	6.5	1.80	13.8	16 00.6	11 30.7	+2 26.4	+0.8880	0.5534	0.2515	+74	+3
40 H. Virginis	5.1	+1.79	-13.9	-15 58.8	13 56.7	+4 47.2	+0.2508	0.5551	-0.2480	+52	-32
43 B. Libræ	5.7	1.79	14.9	21 06.6	7 09 30.4	-0 22.3	+0.8499	0.5700	-0.2127	+69	+2
234 B. Sagittarii	5.9	2.23	5.2	28 00.1	11 16 20.0	+2 17.5	+0.9928	0.5771	+0.0940	+62	+15
248 B. Sagittarii	5.7	2.24	4.8	27 07.7	18 30.4	+4 22.8	+0.2968	0.5753	0.1000	+39	-28
ω Sagittarii	4.8	2.34	3.1	26 29.1	12 05 10.5	-9 21.4	+0.8461	0.5655	0.1279	+64	+4
A Sagittarii	4.9	+2.34	-2.9	-26 23.1	06 29.2	-8 05.6	+0.9117	0.5642	+0.1312	+64	+8
56 B. Capricorni	6.3	2.49	+0.6	24 01.6	13 00 21.4	+9 08.3	+1.1484	0.5464	0.1707	+66	+26
17 Capricorni	5.8	2.43	1.1	21 45.9	03 04.8	+11 46.0	-0.7760	0.5436	0.1760	-9	-90
γ Capricorni	4.8	+2.47	+2.7	-20 07.7	11 27.6	-4 08.1	-0.9819	0.5352	-0.1910	-19	-90

Last Quarter—Dec. 2^d 16^h 50^m·5New Moon—Dec. 9^d 10^h 16^m·0

ELEMENTS OF OCCULTATIONS, 1931.

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DECEMBER.

THE STAR'S					AT CONJUNCTION IN R.A.					Limiting Parallels.	
Name.	Mag.	Reductions from 1931.0.		Apparent Declina- tion.	Greenwich Mean Time.	Hour Angle, H	Y	x'	y'	N.	S.
		$\Delta\alpha$	$\Delta\delta$								
χ Capricorni	5.3	+2.52	+2.6	-21 28.3	13 13 23.2	-2 16.4	+0.8210	0.5333	+0.1942	+0.0	0
27 Capricorni	6.1	2.52	2.8	20 50.0	13 51.2	-1 49.3	+0.2318	0.5328	0.1950	+46	-32
ϕ Capricorni	5.3	2.54	3.2	20 56.3	16 43.6	+0 57.5	+0.9111	0.5300	0.1996	+70	+6
128 B. Capricorni	6.5	2.58	4.6	19 26.9	23 38.2	+7 38.9	+0.7335	0.5235	0.2098	+71	-5
γ Capricorni	3.7	2.58	6.0	16 58.4	14 04 36.2	-11 32.5	-0.8676	0.5189	0.2163	-8	-90
δ Capricorni	2.9	+2.61	+6.4	-16 26.4	08 03.6	-8 11.6	-0.6881	0.5159	+0.2207	+2	-90
152 B. Capricorni	6.5	2.62	6.6	17 10.0	09 39.3	-6 38.3	+0.4488	0.5145	0.2225	+61	-21
ϵ Aquarii	4.4	2.64	8.6	14 12.2	17 56.2	+1 23.1	-0.8734	0.5077	0.2315	-6	-90
39 Aquarii	6.2	2.67	8.8	14 31.9	21 02.4	+4 23.9	+0.2056	0.5054	0.2345	+51	-34
42 Aquarii	5.5	2.67	9.6	13 10.4	23 20.0	+6 37.4	-0.7282	0.5037	0.2365	+3	-90
45 Aquarii	6.1	+2.69	+9.6	-13 38.9	15 00 29.2	+7 44.8	+0.0507	0.5029	+0.2376	+43	-42
50 Aquarii	5.9	2.72	9.9	13 52.6	03 21.4	+10 32.0	+0.9950	0.5008	0.2400	+77	+9
182 B. Aquarii	6.2	2.74	10.4	13 16.0	06 19.3	-10 35.3	+1.0468	0.4988	0.2423	+77	+13
58 Aquarii	6.4	2.71	11.2	11 15.4	07 13.5	-9 42.6	-0.9225	0.4982	0.2430	-7	-90
70 Aquarii	6.1	2.78	12.3	10 55.0	16 19.5	-0 51.9	+0.9466	0.4928	0.2490	+80	+6
81 Aquarii	6.4	+2.79	+14.2	-7 25.7	23 26.3	+6 03.1	-1.0861	0.4892	+0.2528	-16	-90
ϕ Aquarii	5.4	2.83	14.2	8 03.8	16 01 31.4	+8 04.8	+0.1372	0.4882	0.2538	+50	-38
δ Aquarii	4.6	2.84	15.1	6 25.0	06 39.2	-10 55.8	-0.3614	0.4861	0.2558	+26	-65
96 Aquarii	5.7	2.86	15.9	5 29.8	09 30.3	-8 09.3	-0.6416	0.4850	0.2566	+11	-86
317 B. Aquarii	6.3	2.86	15.6	6 16.8	10 14.3	-7 26.4	+0.4083	0.4848	0.2570	+67	-24
337 B. Aquarii	6.4	+2.91	+16.4	-4 54.2	15 14.6	-2 34.2	+0.1842	0.4832	+0.2584	+54	-35
342 B. Aquarii	6.5	2.92	16.7	4 27.6	16 22.5	-1 28.1	-0.0121	0.4828	0.2587	+43	-45
20 Piscium	5.6	2.98	18.0	3 08.4	17 01 45.6	+7 40.1	+0.9699	0.4808	0.2603	+87	+7
60 B. Piscium	6.0	2.98	19.3	0 16.1	05 41.4	+11 29.6	-1.1754	0.4802	0.2604	-21	-90
80 B. Piscium	6.3	3.05	19.4	-0 52.8	11 36.4	-6 44.7	+1.0409	0.4797	0.2605	+90	+11
98 B. Piscium	6.3	+3.10	+20.7	+1 18.7	18 56.2	+0 23.6	+0.5266	0.4796	+0.2599	+76	-17
44 Piscium	6.1	3.14	21.0	1 33.8	23 19.4	+4 39.9	+1.3361	0.4799	+0.2592	+80	+43
60 Piscium	6.2	3.24	23.2	6 22.3	18 11 55.5	-7 03.8	-0.6872	0.4818	0.2557	+10	-84
62 Piscium	6.1	3.25	23.4	6 55.8	12 25.8	-6 34.3	-1.1764	0.4819	0.2555	-21	-84
147 B. Piscium	5.9	3.30	21.6	4 55.9	12 27.6	-6 32.6	+1.0422	0.4819	0.2555	+90	+12
δ Piscium	4.5	+3.25	+23.5	+7 13.0	12 39.3	-6 21.2	-1.4360	0.4820	+0.2555	-56	-67
171 B. Piscium	6.3	3.32	23.3	6 07.1	19 00.1	-0 10.5	+1.3931	0.4836	0.2529	+79	+45
ϵ Piscium	4.4	3.33	23.8	7 31.5	20 45.9	+1 32.5	+0.2803	0.4842	0.2520	+60	-30
π Piscium	5.6	3.54	25.2	11 47.8	19 15 46.9	-3 57.5	+0.2478	0.4921	0.2403	+59	-29
19 Arietis	5.8	3.81	25.5	14 57.9	20 11 02.6	-9 14.5	+1.2179	0.5036	0.2224	+90	+32
27 Arietis	6.4	+3.94	+25.5	+17 24.4	20 16.1	-0 17.2	+0.5345	0.5101	+0.2116	+79	-10
μ Arietis	5.7	4.05	25.7	19 43.5	21 02 03.4	+5 19.6	-0.8065	0.5145	0.2039	+1	-71
47 Arietis	5.8	4.18	25.1	20 24.0	09 51.3	-11 06.9	+0.0026	0.5206	0.1925	+45	-33
ϵ Arietis	4.6	4.18	25.2	21 04.3	10 24.6	-10 34.6	-0.6257	0.5211	0.1917	+11	-67
ζ Arietis	4.8	4.27	24.2	20 47.8	18 01.2	-3 12.4	+1.0874	0.5274	0.1793	+90	+28
66 Arietis	6.1	+4.40	+23.6	+22 34.4	22 00 25.6	+2 59.6	+0.2623	0.5328	+0.1679	+60	-17
7 Tauri	5.9	4.47	23.6	24 14.5	03 12.9	+5 41.4	-1.0893	0.5351	0.1627	-21	-66
16 Tauri	5.4	4.53	22.8	24 04.8	08 00.4	+10 19.3	-0.1562	0.5390	0.1533	+36	-37
17 Tauri	3.8	4.53	22.8	23 54.2	08 02.5	+10 21.4	+0.0402	0.5391	0.1532	+47	-27
18 Tauri	5.6	4.55	22.9	24 37.8	08 09.9	+10 28.5	-0.7294	0.5392	0.1530	+4	-66
η Tauri	4.3	+4.54	+22.8	+24 15.5	08 11.4	+10 29.9	-0.3220	0.5392	+0.1529	+27	-46
20 Tauri	4.1	4.54	22.8	24 09.6	08 28.6	+10 46.6	-0.1711	0.5395	0.1523	+35	-38
21 Tauri	5.8	4.54	22.8	24 20.8	08 30.6	+10 48.5	-0.3687	0.5395	0.1523	+25	-49
22 Tauri	6.5	4.54	22.8	24 19.2	08 34.5	+10 52.3	-0.3302	0.5396	0.1521	+27	-47
23 Tauri	4.3	4.53	22.6	23 44.5	08 42.6	+11 00.1	+0.3190	0.5397	0.1518	+64	-13
η Tauri	2.9	+4.54	+22.6	+23 54.0	09 14.3	+11 30.7	+0.2270	0.5401	+0.1508	+58	-18
104 B. Tauri	5.5	+4.53	+22.4	+23 13.0	09 38.4	+11 54.1	+1.0276	0.5404	+0.1499	+90	+27

First Quarter—Dec. 16^d 22^h 42^m.9

ELEMENTS OF OCCULTATIONS, 1931.

DECEMBER.

THE STAR'S					AT CONJUNCTION IN R.A.					Limiting Parallels.	
Name.	Mag.	Reductions from 1931.0.		Apparent Declina- tion.	Greenwich Mean Time.	Hour Angle, H	Y	x'	y'	N.	S.
		$\Delta\alpha$	$\Delta\delta$								
27 Tauri	3.7	+4.55	+22.4	+23 51.0	22 10 00.3	-11 44.8	+0.3955	0.5408	+0.1492	+70	-8
28 Tauri	5.2	4.56	22.4	23 56.0	10 00.9	-11 44.2	+0.3604	0.5408	0.1492	+63	-13
14 H. Tauri	5.3	4.60	22.6	25 22.7	10 30.7	-11 15.4	-1.1868	0.5412	0.1482	-31	-65
ρ Tauri	5.5	4.74	21.0	26 18.5	19 43.7	-2 21.4	-0.9138	0.5487	0.1282	-8	-64
χ Tauri	5.3	4.79	19.8	25 28.4	23 00 54.9	+2 38.9	+0.6213	0.5527	0.1162	+90	+6
17 B. Aurigæ	6.0	+5.01	+17.0	+27 47.3	13 52.7	-8 51.3	-0.5684	0.5620	+0.0338	+13	-53
38 B. Aurigæ	6.5	5.05	15.7	27 36.3	18 52.4	-4 02.6	+0.0136	0.5652	0.0705	+46	-20
47 B. Aurigæ	6.0	5.08	15.2	27 57.0	21 00.4	-1 59.4	-0.2104	0.5664	0.0647	+33	-32
354 B. Tauri	5.5	5.12	13.9	27 53.6	24 01 40.8	+2 30.6	+0.1227	0.5689	0.0518	+52	-13
22 Aurigæ	6.4	5.17	13.7	28 52.6	02 39.3	+3 26.9	-0.8774	0.5694	0.0490	-7	-62
β Tauri	1.7	+5.17	+13.2	+28 33.3	03 51.6	+4 36.4	-0.4767	0.5700	+0.0456	+18	-45
107 B. Aurigæ	6.5	5.16	12.0	27 37.3	07 50.1	+8 25.9	+0.6754	0.5718	0.0343	+90	+18
116 B. Aurigæ	5.9	5.23	11.8	29 10.8	09 11.7	+9 44.4	-0.9389	0.5724	0.0304	-12	-61
406 B. Tauri	5.6	5.21	10.3	27 57.1	13 58.0	-9 40.1	+0.4791	0.5741	0.0165	+77	+8
136 Tauri	4.6	5.20	10.0	27 36.0	14 55.9	-8 44.5	+0.8664	0.5744	0.0136	+90	+30
154 B. Aurigæ	6.4	+5.26	+9.6	+28 56.1	16 13.6	-7 29.8	-0.5355	0.5748	+0.0098	+14	-46
415 B. Tauri	6.1	5.22	9.0	27 34.4	18 02.8	-5 44.7	+0.9225	0.5753	+0.0044	+90	+35
Aurigæ	5.1	5.28	4.6	28 04.7	25 07 49.7	+7 30.3	+0.1631	0.5774	-0.0366	+55	-10
49 Aurigæ	5.6	5.32	4.2	29 02.8	09 05.7	+8 43.3	-0.9049	0.5774	0.0404	-9	-61
53 Aurigæ	5.8	5.29	4.0	28 19.6	09 34.5	+9 11.0	-0.1666	0.5774	0.0418	+35	-27
28 Geminorum	5.5	+5.32	+3.3	+29 02.6	11 39.6	+11 11.2	-1.0142	0.5774	-0.0481	-18	-61
47 Geminorum	5.6	5.22	0.2	26 58.3	22 25.0	-2 28.3	+0.4745	0.5762	0.0797	+76	+3
53 Geminorum	5.9	5.26	0.8	28 01.1	26 00 15.0	-0 42.6	-0.7738	0.5758	0.0851	0	-62
134 B. Geminorum	6.5	5.22	1.0	26 48.9	00 42.6	-0 16.1	+0.4473	0.5757	0.0864	+74	-6
59 Geminorum	5.7	5.24	1.9	27 46.3	03 44.3	+2 38.6	-0.8291	0.5749	0.0951	3	-66
γ Geminorum	3.8	+5.24	-2.2	+27 56.2	04 12.9	+3 06.3	-1.0460	0.5747	-0.0964	-19	-65
ν Geminorum	4.3	5.19	3.5	27 03.0	08 22.3	+7 06.0	-0.5435	0.5735	0.1081	+14	-54
ϵ Geminorum	5.5	5.13	4.3	25 56.9	11 43.9	+10 19.9	+0.2269	0.5723	0.1174	+58	-14
ω Cancræ	6.1	5.07	6.5	25 34.9	18 39.3	-7 00.3	-0.2680	0.5694	0.1359	+30	-40
4 Cancræ	6.2	5.06	6.5	25 16.7	18 59.4	-6 41.1	+0.0008	0.5692	0.1368	+45	-27
ψ Cancræ	5.9	+5.04	-8.0	+25 43.0	22 36.4	-3 12.2	-0.9646	0.5675	-0.1462	-12	-61
λ Cancræ	5.9	4.96	8.8	24 14.3	27 02 50.0	+0 52.1	-0.0701	0.5654	0.1567	+41	-31
28 Cancræ	6.1	4.93	9.9	24 22.3	06 13.7	+4 08.2	-0.7548	0.5636	0.1650	+3	-60
ν^1 Cancræ	5.7	4.92	10.2	24 18.7	07 27.3	+5 19.1	-0.8960	0.5629	0.1679	-6	-60
ν^2 Cancræ	6.4	4.91	10.4	24 19.1	08 05.2	+5 55.6	-1.0081	0.5625	0.1694	-14	-61
γ Cancræ	4.7	+4.77	-11.2	+21 42.9	12 29.2	+10 10.0	+0.9185	0.5600	-0.1795	+90	+17
8 Leonis	5.9	4.37	16.0	16 44.6	28 12 02.8	+8 53.5	+1.2342	0.5460	0.2259	+90	+31
107 B. Leonis	6.3	4.20	18.6	16 05.4	29 01 04.0	-2 31.9	-1.1700	0.5386	0.2457	-23	-71
34 Leonis	6.4	4.12	18.5	13 41.5	03 49.4	+0 07.9	+0.6038	0.5372	0.2494	+84	-
37 Leonis	5.5	4.09	19.0	14 04.1	06 09.5	+2 23.4	-0.3677	0.5360	0.2523	+26	-5
NEPTUNE	7.7	..	..	+9 19.7	18 30.5	-9 40.0	+1.2737	0.5310	-0.2659	+90	+3
ι Leonis	5.2	+3.84	-20.8	10 54.3	21 29.3	-6 47.0	-1.1319	0.5295	0.2684	-18	-8
χ Leonis	4.6	3.67	20.8	7.42.2	30 05 02.1	+0 31.4	+0.0846	0.5270	0.2742	+49	-3
σ Leonis	4.2	3.57	21.4	6.24.1	12 47.1	+8 01.5	-0.7323	0.5251	0.2788	+7	-8
80 Leonis	6.4	3.52	21.0	4 14.1	15 03.4	+10 13.5	+0.8389	0.5247	0.2799	+90	-
89 Leonis	5.7	+3.46	-21.2	+3 26.3	19 11.3	-9 46.5	+0.4891	0.5240	-0.2815	+74	-1
β Virginis	3.8	3.41	21.8	2 08.9	31 03 04.2	-2 08.7	-0.4277	0.5235	0.2836	+23	-6
27 B. Virginis	6.5	3.30	21.4	+0 54.5	07 09.4	+1 48.8	-0.3288	0.5234	0.2841	+28	-6
162 B. Virginis	6.2	3.11	20.7	-4 14.4	21 05.3	-8 41.8	+0.9407	0.5249	0.2828	+86	+3
200 B. Virginis	6.3	+3.09	-20.6	-4 40.7	22 54.5	-6 56.0	+0.8706	0.5252	-0.2823	+86	+3

Full Moon—Dec. 24^d 23^h 23^m.5Last Quarter—Dec. 32^d 01^h 23^m.1

PREDICTIONS FOR GREENWICH, EDINBURGH AND CAPE OF GOOD HOPE.

Pages 562-567 give predictions of lunar occultations visible at Greenwich, Edinburgh and the Cape of Good Hope, while, by means of the longitude and latitude coefficients a and b , the times given may be adjusted for neighbouring observatories.

Predictions for a number of stars in addition to those whose Besselian Elements are given on pages 528-560 are included, the supplementary list comprising, *inter alia*, the remainder of the fainter stars in the Washington Zodiacal Catalogue (Hedrick).

The following limitations have been imposed:—

1. The star is at least 10° above the horizon at the time given.
2. Except for bright stars and planets no occultations are given that would occur in daylight or bright twilight.
3. Stars fainter than magnitude 4.5 are not included for 24 hours before or after Full Moon, and stars fainter than magnitude 5.5 are excluded for 24-48 hours before and after Full Moon. In the case of the fainter stars a progressive restriction, depending upon the magnitude of the star, has been imposed during the period from one day before last quarter to one day after first quarter, to which the predictions were limited. For the Cape of Good Hope, predictions from the supplementary list of faint stars have been restricted to disappearances.
4. Bright limb phenomena are given only in the case of stars of magnitude 3.5 or brighter for reappearances, and of magnitude 4.5 or brighter for disappearances.

The approximate time of occultation at a place $\Delta\lambda$ degrees west and $\Delta\phi$ degrees north of one of the stations for which particulars are given may be obtained from

$$\text{Approximate time} = \text{Predicted G.M.T.} + a \Delta\lambda + b \Delta\phi$$

For example, if the time of occultation of 415 B. Tauri on January 31 is required for Stonyhurst College Observatory it may be obtained from the predicted particulars for either Edinburgh or Greenwich.

		From Edinburgh		From Greenwich	
		$\Delta\lambda = -0^\circ.7$		$\Delta\lambda = +2^\circ.5$	
		$\Delta\phi = -2^\circ.1$		$\Delta\phi = +2^\circ.4$	
		h	m	h	m
Predicted G.M.T.	..	1	17.5	1	28
$a \Delta\lambda$	..	+	0.3	—	0.5
$b \Delta\phi$	..	+	4.4	—	5.5
G.M.T. at Stonyhurst		1	22	1	22

Whilst, usually, the particulars for the nearer station will be used, the mean of the times obtained from both stations may be employed in the case of places situated in the Midlands or Northern England.

For distances up to 300 miles the error of this formula will, in general, not exceed 2^m. The error in any particular direction is approximately proportional to the square of the distance. In the case of grazing or brief occultations where linear variations cannot be used with safety, the coefficients have been omitted.

The times are given to the nearest half minute only.

The column headed P gives the position angle of the star at the time given, measured from the north point of the Moon in the direction N.E.S.W.

LUNAR OCCULTATIONS, 1931.

OCCULTATIONS VISIBLE AT GREENWICH.

Date.	Star.	Mag.	Phase.	G.M.T.	<i>a</i>	<i>b</i>	<i>P</i>
				^h ^m	^m	^m	^o
Jan. 23	24 Piscium	6.1	D	16 43.5	-0.1	+2.1	4
30	406 B. Tauri	5.6	D	20 40	-1.3	+2.2	46
30	136 Tauri	4.6	D	21 54	-1.4	-2.7	136
31	415 B. Tauri	6.1	D	01 28	-0.2	-2.3	125
Feb. 4	37 Leonis	5.5	R	03 47.5	-1.1	-1.3	277
5	σ Leonis	4.2	D	07 18	-0.7	-1.2	58
5	σ Leonis	4.2	R	07 43.5	+0.3	-2.3	3
10	42 Libræ	5.0	R	05 19	-1.2	+0.1	302
25	B.D. +22° 523	6.6	D	00 01.5	-0.3	-0.2	40
27	107 B. Aurigæ	6.5	D	01 23	-0.2	-0.8	59
28	49 Aurigæ	5.1	D	00 20	—	—	28
Mar. 1	ε Geminorum	5.5	D	02 15.5	-0.2	-1.5	90
9	64 G. Libræ	5.8	R	02 20	-2.0	+1.6	248
23	ζ Arietis	4.8	D	18 38.5	-1.0	0.0	49
23	τ Arietis	5.1	D	21 49.5	+0.4	-2.3	118
27	B.D. +27° 1337	6.4	D	22 22.5	-0.9	-1.2	82
28	134 B. Geminorum	6.5	D	00 25.5	+0.4	-2.2	142
29	λ Cancrī	5.9	D	01 14.5	-0.3	-1.4	85
31	37 Leonis	5.5	D	01 07	-0.5	-1.8	127
Apr. 6	A Scorpii	4.6	R	04 27.5	-1.5	-0.6	253
22	406 B. Tauri	5.6	D	19 47.5	-0.7	-1.4	88
25	4 Cancrī	6.2	D	00 17	-0.2	-1.0	61
25	W.Z.C. 615	7.5	D	23 50.5	-0.1	-1.7	116
May 21	ε Geminorum	5.5	D	22 36.5	-0.1	-0.9	57
25	σ Leonis	4.2	D	20 58	—	—	54
28	g Virginis	5.6	D	00 23	-0.6	-1.9	153
June 6	κ Capricorni	4.8	R	03 04.5	-1.5	+1.1	254
22	27 B. Virginis	6.5	D	20 50	-1.5	-1.1	71
July 7	B.D. -0° 37	7.4	R	00 36.5	-0.6	+1.7	284
11	τ Arietis	5.1	R	01 42.5	+0.2	+1.6	251
19	Mars	1.6	D	14 51	-0.7	-1.4	154
19	Mars	1.6	R	15 57	-1.6	-0.5	282
21	α Virginis (<i>Spica</i>)	1.2	D	19 14	-1.6	-0.9	85
21	α Virginis (<i>Spica</i>)	1.2	R	20 09	-0.7	-1.8	340
Aug. 6	19 Arietis	5.8	R	00 25	-0.6	+1.6	283

LUNAR OCCULTATIONS, 1931.

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OCCULTATIONS VISIBLE AT GREENWICH.

Date.	Star.	Mag.	Phase.	G.M.T.	<i>a</i>	<i>b</i>	<i>P</i>
Aug. 10	B.D. +27° 880	7.3	R	^h 01 ^m 42	^m +0.6	^m +1.8	^o 225
10	406 B. Tauri	5.6	R	02 12.5	-0.5	+0.6	315
10	136 Tauri	4.6	R	03 00	+0.8	+2.8	204
Sept. 7	W.Z.C. 452	6.8	R	02 51	-1.5	-0.8	327
8	B.D. +26° 1564	7.2	R	01 34	+0.7	+2.3	223
14	<i>α</i> Virginis (<i>Spica</i>)	1.2	R	10 19.5	-0.4	+0.3	311
30	<i>ζ</i> Arietis	4.8	R	20 56.5	+0.2	+1.9	226
Oct. 1	66 Arietis	6.1	R	05 34.5	-1.2	-2.1	285
5	B.D. +27° 1337	6.4	R	04 29.5	-1.4	+1.0	268
7	W.Z.C. 623	7.7	R	02 50	-0.3	+1.2	281
23	80 B. Piscium	6.3	D	20 35	—	—	336
28	104 B. Tauri	5.5	R	18 42	+0.4	+1.6	240
31	406 B. Tauri	5.6	R	00 31.5	-0.6	+2.8	225
Nov. 1	<i>c</i> Geminorum	5.5	R	23 07	-0.1	+1.3	278
17	50 Aquarii	5.9	D	18 46.5	-0.7	+1.1	23
25	23 Tauri	4.3	D	01 02	-1.3	+1.7	35
25	<i>η</i> Tauri	2.9	D	02 03	—	—	8
25	<i>η</i> Tauri	2.9	R	02 31.5	—	—	323
25	27 Tauri	3.7	D	02 35.5	-1.2	0.0	54
28	49 Aurigæ	5.1	R	00 51.5	-1.6	-0.9	305
29	<i>c</i> Geminorum	5.5	R	06 15	-0.1	-2.8	333
Dec. 13	<i>φ</i> Capricorni	5.3	D	16 27	-1.4	-0.1	71
13	B.D. -20° 6178	6.7	D	18 15	-1.3	-1.1	85
15	W.Z.C. 1524	6.7	D	18 34	-2.6	-1.9	110
16	B.D. -5° 6011	7.0	D	17 13	-0.2	+2.1	5
17	98 B. Piscium	6.3	D	18 51.5	-0.6	+1.7	19
18	<i>ε</i> Piscium	4.4	D	21 22.5	-0.4	+2.3	8
20	27 Arietis	6.4	D	19 33	-1.1	+1.8	48
21	<i>ζ</i> Arietis	4.8	D	16 28	-1.1	+0.9	124
22	66 Arietis	6.1	D	01 03.5	-1.1	+0.5	39
23	<i>χ</i> Tauri	5.3	D	01 19	-0.8	-2.9	124
29	34 Leonis	6.4	R	04 27.5	-1.1	-1.4	308

LUNAR OCCULTATIONS, 1931.

OCCULTATIONS VISIBLE AT EDINBURGH.

Date.	Star.	Mag.	Phase.	G.M.T.	<i>a</i>	<i>b</i>	<i>P</i>
				^h ^m	^m	^m	[°]
Jan. 23	24 Piscium	6.1	D	16 58.5	—	—	336
30	406 B. Tauri	5.6	D	20 50	—	—	21
30	136 Tauri	4.6	D	21 41	-1.3	-1.2	117
31	415 B. Tauri	6.1	D	01 17.5	-0.4	-2.1	117
Feb. 4	37 Leonis	5.5	R	03 38.5	-1.0	-1.2	279
5	σ Leonis	4.2	D	07 10	-0.8	-1.4	58
5	σ Leonis	4.2	R	07 35	+0.3	-2.0	4
23	36 Arietis	6.5	D	21 55	—	—	133
24	B.D. +22° 523	6.6	D	23 59.5	-0.5	+0.1	29
27	107 B. Aurigæ	6.5	D	01 18	-0.4	-0.8	53
Mar. 1	ε Geminorum	5.5	D	02 08	-0.3	-1.6	96
23	ζ Arietis	4.8	D	18 37	-1.0	+0.8	33
23	τ Arietis	5.1	D	21 41	+0.2	-2.1	107
27	B.D. +27° 1337	6.4	D	22 14.5	-1.0	-1.0	76
28	134 B. Geminorum	6.5	D	00 16.5	+0.2	-2.2	139
29	λ Cancri	5.9	D	01 07	-0.3	-1.5	84
31	37 Leonis	5.5	D	00 57.5	-0.5	-1.7	126
Apr. 22	406 B. Tauri	5.6	D	19 39.5	-0.8	-1.2	79
22	136 Tauri	4.6	D	21 07	—	—	167
25	4 Cancri	6.2	D	00 11.5	-0.3	-1.2	58
25	W.Z.C. 615	7.5	D	23 42.5	-0.1	-1.8	115
May 21	ε Geminorum	5.5	D	22 31.5	-0.2	-1.1	55
25	σ Leonis	4.2	D	20 51.5	—	—	48
28	g Virginis	5.6	D	00 13	-0.6	-1.7	152
June 6	κ Capricorni	4.8	R	03 05	-1.3	+1.1	258
July 7	B.D. -0° 37	7.4	R	00 42.5	-0.5	+1.8	289
11	τ Arietis	5.1	R	01 50.5	+0.2	+1.6	255
19	Mars	1.6	D	14 43.5	-0.7	-0.9	147
19	Mars	1.6	R	15 50.5	-1.3	-0.4	287
21	α Virginis (<i>Spica</i>)	1.2	D	19 05.5	-1.5	-0.7	85
21	α Virginis (<i>Spica</i>)	1.2	R	19 59.5	-0.6	-1.5	340
Aug. 6	19 Arietis	5.8	R	00 30	-0.6	+1.6	291
10	B.D. +27° 880	7.3	R	01 51.5	+0.5	+1.7	234
10	406 B. Tauri	5.6	R	02 11.5	—	—	333
10	136 Tauri	4.6	R	03 12.5	+0.4	+2.3	220

LUNAR OCCULTATIONS, 1931.

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OCCULTATIONS VISIBLE AT EDINBURGH.

Date.	Star.	Mag.	Phase.	G.M.T.	<i>a</i>	<i>b</i>	<i>P</i>
Sept. 8	B.D. +26° 1564	7.2	R	^h 01 ^m 45	^m +0.5	^m +1.9	^o 238
14	α Virginis (<i>Spica</i>)	1.2	R	10 19	-0.3	+0.1	321
30	ζ Arietis	4.8	R	21 05.5	+0.2	+1.9	231
Oct. 1	66 Arietis	6.1	R	05 18.5	—	—	305
5	B.D. +27° 1337	6.4	R	04 28	-1.2	+0.5	283
7	W.Z.C. 623	7.7	R	02 54	-0.3	+1.0	296
28	104 B. Tauri	5.5	R	18 50.5	+0.3	+1.6	246
31	406 B. Tauri	5.6	R	00 40	-0.7	+2.1	241
Nov. 1	c Geminorum	5.5	R	23 12	-0.2	+1.1	292
17	50 Aquarii	5.9	D	18 49.5	-0.4	+1.1	12
25	23 Tauri	4.3	D	01 09	—	—	12
25	27 Tauri	3.7	D	02 33.5	-1.1	+0.8	38
28	49 Aurigæ	5.1	R	00 40	-1.6	-2.3	327
29	c Geminorum	5.5	R	06 01.5	0.0	-3.3	341
Dec. 13	φ Capricorni	5.3	D	16 23	-1.2	+0.1	62
15	W.Z.C. 1524	6.7	D	18 22.5	-1.7	-0.6	91
16	B.D. -5° 6011	7.0	D	17 23.5	+0.6	+2.6	349
17	98 B. Piscium	6.3	D	18 59	-0.1	+2.2	2
20	27 Arietis	6.4	D	19 38.5	-1.0	+2.2	35
21	ζ Arietis	4.8	D	16 31	-0.6	+1.5	112
22	66 Arietis	6.1	D	01 04.5	-1.1	+1.8	20
23	χ Tauri	5.3	D	01 05	-1.0	-2.0	108
29	34 Leonis	6.4	R	04 18.5	-0.9	-1.3	313

OCCULTATIONS VISIBLE AT CAPE OF GOOD HOPE.

Date.	Star.	Mag.	Phase.	G.M.T.	<i>a</i>	<i>b</i>	<i>P</i>
Jan.	4 ι Geminorum	3.8	D	^h 19 ^m 42	^m -1.3	^m -1.4	^o 109
	4 ι Geminorum	3.8	R	20 51	-1.5	-0.4	253
	7 46 Leonis	5.8	R	22 36.5	-1.1	-2.0	317
	28 17 Tauri	3.8	D	17 31.5	-1.7	+0.8	51
	28 16 Tauri	5.4	D	18 01	-0.5	+2.7	6
	28 23 Tauri	4.3	D	18 34.5	—	—	129
	28 20 Tauri	4.1	D	18 36.5	-1.2	+2.3	16
	28 W.Z.C. 224	6.8	D	19 09	-2.4	0.0	107
	28 B.D. +23° 540	6.8	D	19 15	-2.2	+1.0	72
	28 η Tauri	2.9	D	19 16	-2.7	-0.2	113
	28 B.D. +24° 562	6.7	D	19 40	—	—	359
	28 W.Z.C. 227	6.6	D	19 55	-2.1	+1.1	77
	28 η Tauri	2.9	R	20 20.5	-1.9	+2.5	208
	Feb. 3 η Leonis	3.6	D	21 19	-1.7	-0.9	88
	3 η Leonis	3.6	R	22 22	-1.3	-1.9	331
	21 W.Z.C. 63	6.9	D	18 31	-0.6	+2.5	29
	26 22 Aurigæ	6.4	D	20 19.5	-2.5	+2.5	39
	27 211 B. Aurigæ	6.3	D	17 38.5	-1.6	+1.5	32
	28 b^1 Geminorum	5.0	D	19 38	-2.6	+0.5	68
	28 b^2 Geminorum	5.0	D	19 53.5	-2.1	-0.3	106
	Mar. 9 24 G. Scorpii	6.2	R	23 20.5	-0.6	-1.4	282
	13 τ Sagittarii	3.5	D	01 21.5	0.0	-1.8	114
	13 τ Sagittarii	3.5	R	02 26.5	-1.2	-0.6	255
	28 W.Z.C. 558	6.7	D	21 06.5	-0.7	-0.4	135
	29 ξ Cancrī	5.2	D	20 10.5	-2.0	-0.1	106
	29 79 Cancrī	6.1	D	20 47	-2.3	+0.6	88
	29 90 H ¹ Cancrī	6.1	D	22 52.5	-0.5	-0.2	130
	30 η Leonis	3.6	D	20 06	-4.2	+1.6	61
	Apr. 7 163 G. Ophiuchi	6.3	R	22 50.5	-0.1	-2.0	306
	12 128 B. Capricorni	6.5	R	04 13	—	—	304
	23 28 Geminorum	5.5	D	16 59.5	-1.6	-0.2	123
	26 57 B. Leonis	6.5	D	18 11.5	-2.2	-0.4	105
	26 B.D. +19° 2254	6.9	D	19 07.5	-2.3	+0.2	96
	May 4 σ Scorpii	3.0	D	00 33.5	-2.3	-0.5	103
	4 σ Scorpii	3.0	R	01 58.5	-2.0	-0.4	291
	5 43 Ophiuchi	5.4	R	01 52.5	—	—	211
	5 48 G. Sagittarii	6.3	R	21 58.5	-1.1	-0.6	254
	6 58 G. Sagittarii	6.1	R	00 28	-2.2	0.0	256
	9 χ Capricorni	5.3	R	00 41.5	-1.2	+0.2	237
	21 b^2 Geminorum	5.0	D	16 40.5	-3.1	+2.7	52
	22 ν^2 Cancrī	6.4	D	18 49	+0.1	-0.9	154
	25 308 B. Leonis	5.8	D	17 01	-0.7	-2.2	164
	25 B.D. +7° 2440	6.6	D	22 05	-0.3	-0.8	146
	June 1 X Sagittarii	4.4	D	18 40.5	-0.4	-1.0	87
	1 X Sagittarii	4.4	R	19 40	-0.3	-1.9	301

OCCULTATIONS VISIBLE AT CAPE OF GOOD HOPE.

Date.	Star.	Mag.	Phase.	G.M.T.	<i>a</i>	<i>b</i>	<i>P</i>
June 6	50 Aquarii	5.9	R	^h 23 ^m 48.5	^m -0.9	^m +1.0	^o 217
24	h Virginis	5.4	D	16 01	-2.9	0.0	73
27	169 B. Libræ	6.0	D	01 55.5	-1.2	-2.1	160
27	177 B. Libræ	6.2	D	02 27	-0.5	-0.7	144
27	σ Scorpii	3.0	D	17 19.5	—	—	178
27	σ Scorpii	3.0	R	17 51.5	—	—	232
July 4	39 Aquarii	6.2	R	04 07.5	-1.2	+2.1	229
7	98 B. Piscium	6.3	R	00 14.5	-1.3	-1.5	272
8	ε Piscium	4.4	D	01 35	+0.1	+2.6	5
8	ε Piscium	4.4	R	02 30	-2.6	-1.3	274
13	β Tauri	1.7	D	06 22	-2.4	-1.9	119
13	β Tauri	1.7	R	07 20.5	-1.0	+1.1	212
24	50 B. Scorpii	6.4	D	16 07.5	-1.0	-1.9	123
24	85 B. Scorpii	6.0	D	22 48	-1.2	+0.3	111
25	95 G. Ophiuchi	6.1	D	21 43.5	-2.1	-0.4	114
26	38 B. Sagittarii	4.7	D	18 50.5	-1.6	-2.1	121
27	48 G. Sagittarii	6.3	D	00 26	-1.7	0.0	118
27	τ Sagittarii	3.5	D	18 40.5	-1.0	-2.9	129
27	τ Sagittarii	3.5	R	19 45	-2.4	+1.6	228
Aug. 1	317 B. Aquarii	6.3	R	23 44	-1.5	+1.4	221
18	W.Z.C. 890	6.8	D	17 26.5	-2.3	+2.9	66
18	621 B. Virginis	6.4	D	20 40	-0.2	+0.6	106
20	31 B. Scorpii	5.4	D	19 14.5	-1.8	0.0	109
20	40 B. Scorpii	5.4	D	21 49.5	-1.0	-0.5	136
Sept. 14	W.Z.C. 870	7.8	D	18 03	-0.3	+1.4	83
17	α Scorpii (<i>Antares</i>)	1.3	D	15 27.5	-2.4	-0.1	93
17	116 B. Scorpii	6.2	D	16 42	-2.3	+0.5	89
17	α Scorpii (<i>Antares</i>)	1.3	R	16 52.5	-2.1	-0.8	299
19	W.Z.C. 1220	6.8	D	19 31.5	—	—	139
Oct. 1	ρ Tauri	5.5	R	23 20.5	—	—	306
4	183 B. Aurigæ	6.3	R	00 49.5	-1.8	-1.6	289
15	95 G. Ophiuchi	6.1	D	17 53.5	-0.9	+1.8	69
15	C.D. -27° 11527	6.6	D	18 37.5	-0.6	+1.4	80
16	48 G. Sagittarii	6.3	D	19 12.5	-0.7	+1.7	69
19	W.Z.C. 1409	6.8	D	21 55	-0.7	+1.7	69
22	317 B. Aquarii	6.3	D	17 43.5	-2.4	-1.2	91
Nov. 13	W.Z.C. 1243	7.4	D	18 39.5	-1.2	+0.2	117
30	ν ¹ Cancri	5.7	R	01 08	-2.6	+0.5	238
30	ν ² Cancri	6.4	R	02 16	-2.5	-0.3	274
Dec. 6	86 Virginis	5.6	R	02 02	-0.1	-1.3	285
14	ι Aquarii	4.4	D	18 57	-0.4	+2.3	37
22	ρ Tauri	5.5	D	18 40.5	-0.5	+1.0	28
29	107 B. Leonis	6.3	R	00 23	-0.9	-2.7	351
31	β Virginis	3.8	D	02 42	—	—	197
31	β Virginis	3.8	R	03 14.5	—	—	247

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF THE SUN.

Date.	P	B ₀	L ₀	Date.	P	B ₀	L ₀
Jan. 1	+ 2.44	-3.04	3.93	Feb. 16	-17.55	-6.88	118.23
2	1.96	3.15	350.76	17	17.88	6.92	105.06
3	1.47	3.27	337.59	18	18.21	6.95	91.89
4	0.98	3.38	324.42	19	18.53	6.99	78.72
5	0.50	3.50	311.25	20	18.85	7.02	65.55
6	+ 0.01	-3.61	298.08	21	-19.16	-7.05	52.39
7	- 0.48	3.72	284.91	22	19.46	7.08	39.22
8	0.96	3.83	271.74	23	19.76	7.11	26.04
9	1.44	3.94	258.57	24	20.05	7.13	12.87
10	1.93	4.05	245.40	25	20.34	7.15	359.70
11	- 2.41	-4.15	232.24	26	-20.62	-7.17	346.53
12	2.89	4.26	219.07	27	20.90	7.19	333.36
13	3.37	4.36	205.90	28	21.16	7.21	320.19
14	3.84	4.46	192.73	Mar. 1	21.42	7.22	307.02
15	4.32	4.56	179.56	2	21.68	7.23	293.84
16	- 4.79	-4.66	166.40	3	-21.93	-7.24	280.67
17	5.26	4.76	153.23	4	22.17	7.24	267.49
18	5.73	4.86	140.06	5	22.40	7.25	254.32
19	6.19	4.95	126.90	6	22.63	7.25	241.14
20	6.65	5.05	113.73	7	22.86	7.25	227.97
21	- 7.11	-5.14	100.56	8	-23.08	-7.25	214.79
22	7.56	5.23	87.40	9	23.29	7.24	201.62
23	8.01	5.32	74.23	10	23.49	7.24	188.44
24	8.46	5.40	61.07	11	23.69	7.23	175.26
25	8.91	5.49	47.90	12	23.88	7.22	162.08
26	- 9.35	-5.57	34.73	13	-24.06	-7.20	148.90
27	9.78	5.65	21.57	14	24.24	7.18	135.72
28	10.22	5.73	8.40	15	24.41	7.17	122.54
29	10.65	5.81	355.24	16	24.57	7.15	109.36
30	11.07	5.89	342.07	17	24.73	7.13	96.18
31	-11.49	-5.96	328.90	18	-24.88	-7.10	83.00
Feb. 1	11.91	6.03	315.74	19	25.02	7.08	69.82
2	12.32	6.10	302.57	20	25.16	7.05	56.64
3	12.72	6.17	289.40	21	25.29	7.02	43.45
4	13.12	6.24	276.24	22	25.41	6.98	30.27
5	-13.52	-6.30	263.07	23	-25.53	-6.95	17.08
6	13.92	6.36	249.90	24	25.64	6.91	3.90
7	14.30	6.42	236.73	25	25.74	6.87	350.71
8	14.68	6.48	223.57	26	25.83	6.83	337.52
9	15.06	6.54	210.40	27	25.92	6.79	324.34
10	-15.43	-6.60	197.23	28	-26.00	-6.74	311.15
11	15.80	6.65	184.06	29	26.07	6.69	297.96
12	16.16	6.70	170.90	30	26.14	6.64	284.77
13	16.52	6.74	157.73	31	26.20	6.59	271.57
14	16.87	6.79	144.56	Apr. 1	26.25	6.54	258.38
15	-17.21	-6.83	131.40	2	-26.29	-6.49	245.19
16	-17.55	-6.88	118.23	3	-26.33	-6.43	232.00

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF THE SUN.

Date.	P	B_0	L_0	Date.	P	B_0	L_0
Apr. 1	-26°25	-6°54	258°38	May 17	-20°76	-2°44	10°69
2	26°29	6°49	245°19	18	20°47	2°32	357°46
3	26°33	6°43	232°00	19	20°18	2°20	344°24
4	26°36	6°37	218°80	20	19°88	2°09	331°01
5	26°38	6°31	205°61	21	19°58	1°97	317°78
6	-26°40	-6°25	192°41	22	-19°27	-1°85	304°55
7	26°41	6°18	179°21	23	18°95	1°74	291°32
8	26°41	6°12	166°01	24	18°63	1°62	278°09
9	26°40	6°05	152°82	25	18°30	1°50	264°86
10	26°39	5°98	139°62	26	17°96	1°38	251°63
11	-26°37	-5°91	126°42	27	-17°62	-1°26	238°40
12	26°34	5°84	113°21	28	17°28	1°14	225°17
13	26°30	5°76	100°01	29	16°93	1°02	211°94
14	26°26	5°68	86°81	30	16°57	0°90	198°70
15	26°21	5°61	73°60	31	16°21	0°78	185°47
16	-26°15	-5°53	60°40	June 1	-15°84	-0°66	172°24
17	26°09	5°45	47°20	2	15°47	0°54	159°00
18	26°02	5°36	33°99	3	15°09	0°42	145°77
19	25°94	5°28	20°78	4	14°71	0°30	132°53
20	25°85	5°19	7°58	5	14°32	0°18	119°30
21	-25°75	-5°11	354°37	6	-13°93	-0°06	106°06
22	25°65	5°02	341°16	7	13°54	+0°06	92°83
23	25°54	4°93	327°95	8	13°14	0°18	79°59
24	25°43	4°84	314°74	9	12°73	0°30	66°35
25	25°30	4°75	301°53	10	12°32	0°42	53°12
26	-25°17	-4°65	288°32	11	-11°91	+0°54	39°88
27	25°03	4°56	275°10	12	11°50	0°66	26°65
28	24°89	4°46	261°89	13	11°08	0°78	13°41
29	24°73	4°36	248°67	14	10°66	0°90	0°18
30	24°57	4°26	235°46	15	10°23	1°02	346°94
May 1	-24°40	-4°16	222°24	16	-9°80	+1°14	333°70
2	24°23	4°06	209°03	17	9°37	1°26	320°47
3	24°05	3°96	195°81	18	8°94	1°38	307°23
4	23°86	3°86	182°59	19	8°50	1°50	293°99
5	23°66	3°75	169°37	20	8°06	1°62	280°76
6	-23°46	-3°65	156°15	21	-7°62	+1°73	267°52
7	23°25	3°54	142°93	22	7°17	1°85	254°28
8	23°03	3°44	129°71	23	6°73	1°96	241°04
9	22°80	3°33	116°49	24	6°28	2°08	227°81
10	22°57	3°22	103°26	25	5°83	2°20	214°57
11	-22°33	-3°11	90°04	26	-5°38	+2°31	201°33
12	22°09	3°00	76°82	27	4°93	2°42	188°10
13	21°84	2°89	63°59	28	4°48	2°54	174°86
14	21°58	2°78	50°37	29	4°03	2°65	161°62
15	21°31	2°66	37°14	30	3°57	2°76	148°39
16	-21°04	-2°55	23°92	July 1	-3°12	+2°87	135°15
17	-20°76	-2°44	10°69	2	-2°66	+2°98	121°91

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF THE SUN.

Date.	<i>P</i>	<i>B</i> ₀	<i>L</i> ₀	Date.	<i>P</i>	<i>B</i> ₀	<i>L</i> ₀
July 1	— 3°12	+2°87	135°15	Aug. 16	+16°11	+6°69	246°64
2	2°66	2°98	121°91	17	16°45	6°74	233°42
3	2°21	3°09	108°68	18	16°78	6°78	220°20
4	1°75	3°20	95°44	19	17°11	6°82	206°98
5	1°29	3°31	82°20	20	17°44	6°86	193°77
6	— 0°84	+3°42	68°97	21	+17°76	+6°90	180°55
7	— 0°38	3°52	55°73	22	18°07	6°94	167°34
8	+ 0°07	3°63	42°50	23	18°38	6°97	154°12
9	0°53	3°73	29°26	24	18°69	7°00	140°91
10	0°98	3°83	16°03	25	18°99	7°03	127°70
11	+ 1°43	+3°93	2°80	26	+19°28	+7°06	114°48
12	1°89	4°04	349°56	27	19°57	7°09	101°27
13	2°34	4°14	336°33	28	19°86	7°11	88°06
14	2°79	4°23	323°10	29	20°14	7°14	74°85
15	3°23	4°33	309°86	30	20°41	7°16	61°64
16	+ 3°68	+4°43	296°63	31	+20°68	+7°18	48°43
17	4°13	4°52	283°40	Sept. 1	20°94	7°19	35°22
18	4°57	4°61	270°17	2	21°20	7°21	22°01
19	5°01	4°71	256°94	3	21°45	7°22	8°80
20	5°45	4°80	243°71	4	21°69	7°23	355°59
21	+ 5°88	+4°89	230°48	5	+21°93	+7°24	342°38
22	6°32	4°98	217°24	6	22°17	7°24	329°18
23	6°75	5°06	204°01	7	22°40	7°25	315°97
24	7°18	5°15	190°78	8	22°62	7°25	302°76
25	7°61	5°23	177°56	9	22°84	7°25	289°56
26	+ 8°03	+5°32	164°33	10	+23°05	+7°25	276°35
27	8°45	5°40	151°10	11	23°25	7°24	263°15
28	8°87	5°48	137°87	12	23°45	7°24	249°95
29	9°28	5°56	124°64	13	23°64	7°23	236°74
30	9°69	5°63	111°42	14	23°83	7°22	223°54
31	+10°10	+5°71	98°19	15	+24°01	+7°20	210°34
Aug. 1	10°50	5°78	84°96	16	24°19	7°19	197°14
2	10°90	5°85	71°74	17	24°36	7°17	183°94
3	11°30	5°93	58°51	18	24°52	7°15	170°73
4	11°70	6°00	45°29	19	24°68	7°13	157°53
5	+12°09	+6°06	32°06	20	+24°83	+7°11	144°33
6	12°48	6°13	18°84	21	24°97	7°09	131°13
7	12°86	6°19	5°62	22	25°11	7°06	117°93
8	13°24	6°25	352°39	23	25°24	7°03	104°73
9	13°61	6°31	339°17	24	25°36	7°00	91°54
10	+13°98	+6°37	325°95	25	+25°47	+6°97	78°34
11	14°35	6°43	312°73	26	25°58	6°93	65°14
12	14°71	6°49	299°51	27	25°69	6°89	51°94
13	15°06	6°54	286°29	28	25°79	6°85	38°74
14	15°41	6°59	273°07	29	25°88	6°81	25°55
15	+15°76	+6°64	259°85	30	+25°96	+6°77	12°35
16	+16°11	+6°69	246°64	Oct. 1	+26°03	+6°72	359°16

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF THE SUN.

Date.	P	B ₀	L ₀	Date.	P	B ₀	L ₀
Oct. 1	+26°03	+6°72	359°16	Nov. 16	+21°46	+2°73	112°49
2	26°10	6°67	345°96	17	21°18	2°61	99°30
3	26°16	6°62	332°76	18	20°89	2°49	86°12
4	26°22	6°57	319°57	19	20°59	2°37	72°94
5	26°27	6°51	306°38	20	20°29	2°25	59°76
6	+26°31	+6°46	293°18	21	+19°98	+2°13	46°58
7	26°34	6°40	279°99	22	19°66	2°00	33°40
8	26°37	6°34	266°80	23	19°34	1°88	20°22
9	26°39	6°28	253°60	24	19°01	1°76	7°03
10	26°40	6°21	240°41	25	18°67	1°63	353°85
11	+26°41	+6°15	227°22	26	+18°32	+1°51	340°67
12	26°40	6°08	214°03	27	17°97	1°38	327°49
13	26°40	6°01	200°84	28	17°61	1°26	314°31
14	26°38	5°94	187°64	29	17°24	1°13	301°13
15	26°35	5°87	174°45	30	16°87	1°00	287°95
16	+26°32	+5°80	161°26	Dec. 1	+16°50	+0°88	274°77
17	26°28	5°72	148°07	2	16°11	0°75	261°60
18	26°23	5°64	134°88	3	15°72	0°62	248°42
19	26°18	5°56	121°69	4	15°32	0°50	235°24
20	26°11	5°48	108°50	5	14°92	0°37	222°06
21	+26°04	+5°40	95°31	6	+14°52	+0°24	208°88
22	25°96	5°31	82°12	7	14°10	+0°11	195°71
23	25°88	5°22	68°94	8	13°68	-0°01	182°53
24	25°78	5°14	55°75	9	13°26	0°14	169°35
25	25°68	5°05	42°56	10	12°83	0°27	156°18
26	+25°57	+4°96	29°37	11	+12°40	-0°40	143°00
27	25°45	4°86	16°18	12	11°96	0°53	129°83
28	25°33	4°77	3°00	13	11°52	0°66	116°65
29	25°20	4°67	349°81	14	11°08	0°78	103°48
30	25°06	4°58	336°62	15	10°63	0°91	90°30
31	+24°91	+4°48	323°43	16	+10°18	-1°04	77°13
Nov. 1	24°75	4°38	310°25	17	9°72	1°17	63°95
2	24°59	4°28	297°06	18	9°26	1°29	50°78
3	24°42	4°17	283°88	19	8°80	1°42	37°60
4	24°24	4°07	270°69	20	8°33	1°54	24°43
5	+24°05	+3°96	257°50	21	+ 7°86	-1°67	11°26
6	23°85	3°86	244°32	22	7°39	1°80	358°08
7	23°65	3°75	231°14	23	6°91	1°92	344°91
8	23°43	3°64	217°95	24	6°43	2°04	331°74
9	23°21	3°53	204°77	25	5°95	2°16	318°56
10	+22°99	+3°42	191°58	26	+ 5°47	-2°29	305°39
11	22°75	3°30	178°40	27	4°99	2°41	292°22
12	22°51	3°19	165°22	28	4°51	2°53	279°05
13	22°26	3°08	152°04	29	4°03	2°65	265°88
14	22°00	2°96	138°85	30	3°55	2°77	252°70
15	+21°73	+2°84	125°67	31	+ 3°06	-2°89	239°53
16	+21°46	+2°73	112°49	32	+ 2°57	-3°01	226°36

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF THE MOON.

Date.	The Earth's Selenographic		Physical Libration.		The Sun's Selenographic		Position Angle of		Fraction Illuminated.
	Long.	Lat.	Long.	Lat.	Colong.	Lat.	Moon's Axis.	Terminator.	
Jan. 1	-6°68	-3°60	0°00	+0°03	50°68	-1°51	346°59	348°0	0.85
2	6°43	4°77	0°00	0°03	62°82	1°51	351°17	355°6	0.92
3	5°70	5°70	0°00	0°03	74°94	1°51	356°68	7°3	0.97
4	4°56	6°30	0°00	0°03	87°07	1°51	2°74	35°1	0.99
5	3°08	6°51	0°00	0°03	99°19	1°51	8°70	329°6	1°00
6	-1°41	-6°28	0°00	+0°02	111°31	-1°51	13°91	1°2	0.97
7	+0°29	5°63	0°00	0°02	123°44	1°51	17°91	12°2	0.92
8	1°88	4°61	0°00	0°02	135°57	1°51	20°53	18°3	0.84
9	3°25	3°29	0°00	0°02	147°71	1°51	21°84	21°7	0.74
10	4°34	1°79	0°00	0°02	159°85	1°51	21°96	23°0	0.64
11	+5°11	-0°20	0°00	+0°02	172°00	-1°51	21°00	22°5	0.52
12	5°60	+1°36	0°00	0°02	184°16	1°52	19°04	20°3	0.41
13	5°82	2°82	+0°01	0°03	196°32	1°52	16°11	16°6	0.31
14	5°82	4°10	0°01	0°03	208°49	1°52	12°26	11°3	0.22
15	5°62	5°15	0°01	0°03	220°67	1°52	7°62	4°4	0.14
16	+5°24	+5°93	+0°01	+0°03	232°85	-1°53	2°43	355°8	0.08
17	4°71	6°40	+0°01	0°03	245°04	1°53	357°08	344°4	0.03
18	4°01	6°56	0°00	0°03	257°22	1°53	351°98	322°4	0.01
19	3°15	6°41	0°00	0°03	269°41	1°53	347°48	49°8	0.00
20	2°12	5°97	0°00	0°03	281°60	1°53	343°82	1°3	0.02
21	+0°95	+5°28	0°00	+0°03	293°79	-1°52	341°08	348°8	0.05
22	-0°36	4°35	0°00	0°03	305°98	1°52	339°24	342°7	0.09
23	1°74	3°25	0°00	0°03	318°16	1°51	338°23	339°2	0.15
24	3°16	2°01	0°00	0°03	330°33	1°51	338°01	337°5	0.23
25	4°53	+0°67	0°00	0°03	342°51	1°50	338°55	337°2	0.31
26	-5°77	-0°71	0°00	+0°03	354°67	-1°49	339°86	338°2	0.40
27	6°78	2°08	0°00	0°03	6°84	1°48	342°00	340°5	0.50
28	7°47	3°40	0°00	0°02	18°99	1°46	345°07	344°3	0.60
29	7°74	4°57	-0°01	0°02	31°14	1°45	349°13	340°5	0.70
30	7°53	5°54	0°01	0°02	43°28	1°44	354°16	356°4	0.79
31	-6°81	-6°23	-0°01	+0°02	55°42	-1°43	359°95	4°8	0.87
Feb. 1	5°59	6°55	0°01	0°02	67°55	1°41	6°00	15°2	0.94
2	3°94	6°44	0°01	0°02	79°68	1°39	11°64	30°6	0.98
3	-2°01	5°90	0°01	0°02	91°81	1°38	16°28	283°7	1°00
4	+0°02	4°93	-0°01	0°02	103°94	1°36	19°57	5°7	0.98
5	+1°98	-3°61	0°00	+0°02	116°07	-1°34	21°46	17°5	0.94
6	3°71	2°06	0°00	0°02	128°20	1°32	22°03	21°7	0.87
7	5°11	-0°40	0°00	0°02	140°34	1°30	21°41	22°7	0.78
8	6°12	+1°24	0°00	0°02	152°49	1°29	19°70	21°6	0.68
9	6°74	2°77	0°00	0°02	164°64	1°28	16°97	18°7	0.57
10	+6°99	+4°11	0°00	+0°02	176°80	-1°26	13°28	14°3	0.47
11	6°91	5°19	0°00	0°02	188°97	1°25	8°78	8°6	0.36
12	6°56	5°99	0°00	0°02	201°14	1°24	3°69	1°9	0.27
13	5°97	6°48	0°00	0°02	213°32	1°23	358°37	354°7	0.18
14	5°19	6°66	0°00	0°03	225°51	1°22	353°22	347°0	0.11
15	+4°25	+6°53	0°00	+0°03	237°70	-1°21	348°59	339°0	0.06
16	+3°17	+6°12	0°00	+0°03	249°90	-1°20	344°74	329°2	0.02

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF THE MOON.

Date.	The Earth's Selenographic		Physical Libration.		The Sun's Selenographic		Position Angle of		Fraction Illuminated.
	Long.	Lat.	Long.	Lat.	Colong.	Lat.	Moon's Axis.	Terminator.	
Feb. 16	+3°17	+6°12	0°00	+0°03	249°90	-1°20	344°74	329°2	0°02
17	1°98	5°44	0°00	0°03	262°09	1°18	341°76	306°3	0°00
18	+0°68	4°52	-0°01	0°03	274°29	1°17	339°68	13°5	0°00
19	-0°68	3°41	0°01	0°02	286°49	1°16	338°45	346°2	0°02
20	2°09	2°16	0°01	0°02	298°68	1°14	338°01	339°8	0°05
21	-3°49	+0°81	-0°01	+0°02	310°88	-1°12	338°33	337°5	0°10
22	4°82	-0°58	0°01	0°02	323°07	1°10	339°41	337°4	0°17
23	6°03	1°96	0°01	0°02	335°26	1°08	341°28	338°9	0°24
24	7°03	3°28	0°01	0°02	347°44	1°06	344°01	341°7	0°33
25	7°74	4°47	0°01	0°02	359°61	1°04	347°66	346°0	0°43
26	-8°08	-5°47	-0°01	+0°02	11°78	-1°02	352°24	351°6	0°53
27	7°99	6°22	0°01	0°02	23°95	0°99	357°62	358°4	0°64
28	7°42	6°64	0°01	0°02	36°10	0°96	3°45	6°0	0°74
Mar. 1	6°35	6°67	0°01	0°02	48°26	0°94	9°19	13°9	0°83
2	4°84	6°28	0°01	0°02	60°40	0°91	14°24	21°7	0°91
3	-2°98	-5°44	-0°01	+0°02	72°55	-0°88	18°15	30°1	0°97
4	-0°92	4°22	0°01	0°02	84°69	0°85	20°71	49°0	1°00
5	+1°17	2°68	0°01	0°02	96°83	0°81	21°90	8°9	1°00
6	3°12	-0°97	0°01	0°02	108°97	0°78	21°81	21°5	0°96
7	4°78	+0°79	0°01	0°02	121°11	0°75	20°51	22°9	0°90
8	+6°07	+2°45	-0°01	+0°02	133°26	-0°72	18°09	21°1	0°82
9	6°94	3°92	0°01	0°02	145°42	0°70	14°60	17°4	0°73
10	7°37	5°12	0°01	0°02	157°58	0°67	10°20	12°3	0°63
11	7°40	6°00	0°01	0°02	169°75	0°65	5°13	6°1	0°52
12	7°07	6°56	0°01	0°02	181°93	0°63	359°74	359°3	0°42
13	+6°44	+6°79	-0°01	+0°02	194°12	-0°61	354°46	352°6	0°32
14	5°55	6°71	0°01	0°02	206°31	0°59	349°67	346°2	0°24
15	4°47	6°32	0°01	0°02	218°51	0°57	345°63	340°5	0°16
16	3°25	5°67	0°01	0°02	230°71	0°55	342°44	335°6	0°10
17	1°93	4°78	0°01	0°02	242°92	0°53	340°15	331°3	0°05
18	+0°55	+3°68	-0°01	+0°02	255°13	-0°51	338°71	326°6	0°02
19	-0°84	2°43	0°01	0°02	267°34	0°49	338°07	309°1	0°00
20	2°21	+1°07	0°01	0°02	279°55	0°47	338°19	342°8	0°00
21	3°52	-0°34	0°01	0°02	291°76	0°45	339°07	336°6	0°02
22	4°73	1°75	0°02	0°02	303°98	0°43	340°74	336°8	0°06
23	-5°79	-3°10	-0°02	+0°02	316°18	-0°40	343°24	339°0	0°12
24	6°64	4°33	0°02	0°02	328°39	0°38	346°63	342°8	0°19
25	7°25	5°37	0°02	0°02	340°59	0°35	350°91	347°8	0°28
26	7°55	6°17	0°02	0°02	352°78	0°32	355°99	354°0	0°37
27	7°49	6°66	0°02	0°02	4°97	0°29	1°59	1°0	0°48
28	-7°05	-6°80	-0°02	+0°02	17°15	-0°26	7°24	8°2	0°59
29	6°20	6°55	0°02	0°02	29°33	0°23	12°42	15°0	0°69
30	4°97	5°89	0°02	0°02	41°50	0°20	16°67	20°8	0°80
31	3°42	4°82	0°02	0°02	53°67	0°16	19°73	25°3	0°88
Apr. 1	-1°63	3°41	0°01	0°02	65°83	0°12	21°50	28°2	0°95
2	+0°27	-1°75	-0°01	+0°02	77°98	-0°08	22°00	30°0	0°99
3	+2°14	+0°03	-0°01	+0°02	90°14	-0°05	21°26	23°2	1°00

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF THE MOON.

Date.	The Earth's Selenographic		Physical Libration.		The Sun's Selenographic		Position Angle of		Fraction Illuminated.
	Long.	Lat.	Long.	Lat.	Colong.	Lat.	Moon's Axis.	Terminator.	
Apr. 1	° -1.63	° -3.41	° -0.01	° +0.02	° 65.83	° -0.12	° 21.50	° 28.2	0.95
2	+0.27	-1.75	0.01	0.02	77.98	0.08	22.00	30.0	0.99
3	2.14	+0.03	0.01	0.02	90.14	0.05	21.26	23.2	1.00
4	3.84	1.80	0.01	0.02	102.30	-0.01	19.33	25.5	0.98
5	5.25	3.41	0.01	0.02	114.46	+0.02	16.23	22.1	0.93
6	+6.30	+4.76	-0.01	+0.02	126.62	+0.06	12.07	17.1	0.86
7	6.92	5.80	0.01	0.02	138.80	0.09	7.06	10.9	0.78
8	7.11	6.48	0.01	0.02	150.97	0.12	1.57	4.0	0.68
9	6.89	6.81	0.01	0.02	163.16	0.14	356.07	357.1	0.59
10	6.31	6.80	0.01	0.02	175.35	0.17	351.01	350.6	0.48
11	+5.43	+6.48	-0.01	+0.02	187.55	+0.19	346.68	345.0	0.39
12	4.31	5.88	0.01	0.02	199.75	0.21	343.24	340.4	0.30
13	3.03	5.04	0.01	0.02	211.96	0.23	340.70	336.9	0.21
14	1.65	3.98	0.01	0.02	224.18	0.25	339.04	334.6	0.14
15	+0.25	2.76	0.01	0.02	236.40	0.26	338.18	333.5	0.08
16	-1.12	+1.41	-0.01	+0.02	248.62	+0.28	338.09	334.0	0.04
17	2.41	0.00	0.01	0.02	260.85	0.30	338.77	337.3	0.01
18	3.57	-1.43	0.01	0.02	273.08	0.33	340.22	46.2	0.00
19	4.57	2.80	0.02	0.02	285.31	0.35	342.52	329.8	0.01
20	5.37	4.07	0.02	0.02	297.54	0.37	345.72	336.8	0.04
21	-5.95	-5.16	-0.02	+0.02	309.76	+0.39	349.82	342.9	0.09
22	6.30	6.01	0.02	0.02	321.99	0.42	354.74	349.5	0.15
23	6.39	6.56	0.02	0.02	334.20	0.44	0.22	356.6	0.23
24	6.21	6.78	0.02	0.02	346.42	0.47	5.83	3.9	0.33
25	5.75	6.62	0.02	0.02	358.63	0.50	11.07	10.7	0.44
26	-5.03	-6.08	-0.02	+0.02	10.83	+0.53	15.49	16.6	0.55
27	4.05	5.16	0.01	0.02	23.02	0.56	18.83	21.2	0.66
28	2.84	3.90	0.01	0.02	35.21	0.59	20.98	24.1	0.77
29	-1.44	2.37	0.01	0.02	47.39	0.62	21.94	25.3	0.86
30	+0.07	-0.68	0.01	0.02	59.57	0.66	21.72	24.2	0.93
May 1	+1.60	+1.07	-0.01	+0.02	71.75	+0.69	20.32	19.2	0.98
2	3.07	2.74	0.01	0.02	83.92	0.73	17.76	344.1	1.00
3	4.35	4.20	0.01	0.02	96.10	0.76	14.04	32.0	0.99
4	5.36	5.37	0.01	0.02	108.27	0.79	9.29	19.5	0.96
5	6.01	6.20	-0.01	0.02	120.45	0.82	3.84	10.8	0.90
6	+6.27	+6.66	0.00	+0.02	132.64	+0.84	358.17	2.8	0.83
7	6.13	6.76	-0.01	0.02	144.82	0.87	352.77	355.5	0.74
8	5.61	6.52	0.01	0.02	157.02	0.89	348.07	349.2	0.65
9	4.76	5.99	0.01	0.02	169.22	0.91	344.27	344.0	0.55
10	3.66	5.20	0.01	0.02	181.43	0.92	341.42	340.0	0.46
11	+2.37	+4.20	-0.01	+0.02	193.65	+0.94	339.48	337.3	0.36
12	+0.99	3.02	0.01	0.02	205.87	0.95	338.37	335.8	0.27
13	-0.40	1.72	0.01	0.02	218.09	0.97	338.05	335.5	0.19
14	1.73	+0.34	0.01	0.02	230.33	0.98	338.49	336.6	0.12
15	2.91	-1.07	0.01	0.02	242.56	0.99	339.70	339.6	0.07
16	-3.90	-2.46	-0.01	+0.02	254.80	+1.01	341.75	345.8	0.03
17	-4.66	-3.74	-0.01	+0.01	267.04	+1.02	344.70	4.2	0.00

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF THE MOON.

Date.	The Earth's Selenographic		Physical Libration.		The Sun's Selenographic		Position Angle of		Fraction Illuminated.
	Long.	Lat.	Long.	Lat.	Colong.	Lat.	Moon's Axis.	Terminator.	
May 17	-4°66	-3°74	-0°01	+0°01	267°04	+1°02	344°70	4°2	0°00
18	5°15	4°87	0°01	0°01	279°29	1°04	348°59	305°9	0°00
19	5°37	5°77	0°01	0°01	291°53	1°05	353°38	337°7	0°02
20	5°34	6°38	0°01	0°01	303°77	1°07	358°82	349°4	0°06
21	5°07	6°65	0°01	0°01	316°01	1°08	4°50	358°5	0°12
22	-4°60	-6°55	-0°01	+0°01	328°25	+1°10	9°90	6°5	0°20
23	3°96	6°08	0°01	0°01	340°48	1°12	14°53	13°1	0°30
24	3°19	5°24	0°01	0°01	352°70	1°14	18°10	18°3	0°41
25	2°30	4°07	0°01	0°01	4°91	1°16	20°51	21°9	0°52
26	1°32	2°65	0°01	0°01	17°12	1°18	21°77	23°7	0°63
27	-0°26	-1°06	-0°01	+0°01	29°33	+1°21	21°90	23°9	0°74
28	+0°85	+0°61	0°00	0°01	41°52	1°23	20°94	22°0	0°84
29	1°96	2°23	0°00	0°01	53°72	1°26	18°85	17°8	0°91
30	3°03	3°71	0°00	0°01	65°90	1°28	15°63	9°6	0°97
31	3°98	4°95	0°00	0°01	78°09	1°31	11°32	346°9	0°99
June 1	+4°73	+5°86	0°00	+0°01	90°28	+1°33	6°12	48°2	1°00
2	5°21	6°43	0°00	0°01	102°46	1°35	0°46	15°8	0°97
3	5°37	6°63	0°00	0°01	114°65	1°37	354°84	3°5	0°93
4	5°18	6°48	0°00	0°01	126°85	1°38	349°78	354°9	0°87
5	4°65	6°02	0°00	0°02	139°04	1°39	345°57	348°3	0°80
6	+3°79	+5°28	0°00	+0°01	151°25	+1°40	342°34	343°3	0°71
7	2°68	4°32	0°00	0°01	163°46	1°41	340°07	339°7	0°62
8	1°40	3°19	0°00	0°01	175°67	1°42	338°68	337°4	0°53
9	+0°02	1°92	0°00	0°01	187°89	1°42	338°09	336°4	0°43
10	-1°36	+0°58	0°00	0°01	200°12	1°43	338°26	336°6	0°34
11	-2°65	-0°80	0°00	+0°01	212°35	+1°43	339°20	338°0	0°25
12	3°75	2°16	-0°01	0°01	224°59	1°43	340°94	340°9	0°17
13	4°60	3°45	0°01	0°01	236°83	1°44	343°58	345°7	0°10
14	5°14	4°59	0°01	0°01	249°08	1°44	347°16	353°3	0°05
15	5°34	5°53	0°01	0°01	261°33	1°44	351°71	7°5	0°02
16	-5°21	-6°19	-0°01	+0°01	273°58	+1°45	357°05	68°1	0°00
17	4°76	6°52	0°01	0°01	285°84	1°45	2°81	338°6	0°01
18	4°07	6°48	0°01	0°01	298°08	1°46	8°44	357°6	0°04
19	3°20	6°05	-0°01	0°01	310°33	1°46	13°40	7°9	0°10
20	2°24	5°24	0°00	0°01	322°58	1°46	17°31	14°9	0°18
21	-1°24	-4°12	0°00	+0°01	334°81	+1°47	20°03	19°6	0°28
22	-0°25	2°73	0°00	0°01	347°04	1°48	21°56	22°4	0°38
23	+0°69	-1°18	0°00	0°01	359°27	1°49	21°96	23°5	0°50
24	1°57	+0°44	0°00	0°01	11°49	1°50	21°29	22°7	0°61
25	2°40	2°02	0°00	0°01	23°70	1°51	19°54	20°2	0°72
26	+3°15	+3°48	0°00	+0°01	35°90	+1°52	16°72	15°8	0°81
27	3°82	4°71	0°00	0°01	48°10	1°53	12°81	9°3	0°89
28	4°37	5°66	+0°01	0°01	60°30	1°54	7°97	359°7	0°95
29	4°75	6°28	0°01	0°01	72°49	1°55	2°49	342°6	0°99
30	4°91	6°54	0°01	0°01	84°68	1°56	356°84	271°5	1°00
July 1	+4°82	+6°45	+0°01	+0°01	96°88	+1°56	351°55	13°8	0°99
2	+4°44	+6°05	+0°01	+0°01	109°07	+1°56	347°01	356°9	0°96

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF THE MOON.

Date.	The Earth's Selenographic		Physical Libration.		The Sun's Selenographic		Position Angle of		Fraction Illuminated.
	Long.	Lat.	Long.	Lat.	Colong.	Lat.	Moon's Axis.	Terminator.	
July 1	+4°82	+6°45	+0°01	+0°01	96°88	+1°56	351°55	13°8	0.99
2	4°44	6°05	0°01	0°01	109°07	1°56	347°01	356°9	0.96
3	3°77	5°35	+0°01	0°01	121°27	1°57	343°41	348°3	0.91
4	2°84	4°42	0°00	0°01	133°47	1°56	340°79	342°8	0.85
5	1°68	3°31	0°00	+0°01	145°67	1°56	339°08	339°4	0.77
6	+0°36	+2°06	0°00	0°00	157°88	+1°56	338°22	337°4	0.69
7	-1°04	+0°74	0°00	+0°01	170°10	1°55	338°12	336°7	0.59
8	2°42	-0°62	0°00	0°01	182°32	1°54	338°78	337°2	0.50
9	3°70	1°97	0°00	0°01	194°55	1°54	340°22	339°0	0.40
10	4°77	3°25	0°00	0°01	206°78	1°53	342°50	342°2	0.31
11	-5°54	-4°40	0°00	+0°01	219°02	+1°52	345°70	346°8	0.22
12	5°96	5°37	0°00	0°01	231°26	1°51	349°87	353°2	0.14
13	5°98	6°08	0°00	0°01	243°51	1°50	354°94	1°7	0.08
14	5°58	6°48	0°00	0°01	255°76	1°49	0°63	14°0	0.03
15	4°80	6°51	0°00	0°01	268°01	1°48	6°44	42°7	0.00
16	-3°72	-6°15	0°00	+0°01	280°26	+1°47	11°78	336°4	0.00
17	2°44	5°38	0°00	0°01	292°52	1°46	16°16	5°8	0.03
18	-1°08	4°27	0°00	0°01	304°76	1°46	19°33	15°6	0.08
19	+0°27	2°87	0°00	0°01	317°01	1°45	21°24	20°6	0.16
20	1°51	-1°30	0°00	0°01	329°25	1°44	21°95	22°9	0.26
21	+2°60	+0°35	+0°01	+0°01	341°48	+1°44	21°54	23°1	0.36
22	3°52	1°95	0°01	0°01	353°71	1°43	20°06	21°6	0.48
23	4°24	3°42	0°01	0°01	5°93	1°43	17°49	18°3	0.59
24	4°79	4°66	0°01	0°01	18°14	1°42	13°88	13°4	0.69
25	5°16	5°63	0°01	0°01	30°35	1°42	9°31	7°0	0.79
26	+5°36	+6°27	+0°01	+0°01	42°55	+1°41	4°04	359°2	0.87
27	5°36	6°57	0°01	0°01	54°75	1°41	358°48	349°9	0.93
28	5°16	6°53	0°01	0°01	66°94	1°40	353°12	337°8	0.97
29	4°74	6°16	0°01	0°01	79°13	1°39	348°36	310°7	1.00
30	4°10	5°50	0°01	0°01	91°32	1°38	344°48	21°5	1.00
Aug. 31	+3°22	+4°59	+0°01	+0°01	103°51	+1°37	341°56	351°9	0.98
1	2°14	3°48	0°01	0°01	115°70	1°36	339°56	343°2	0.94
2	+0°89	2°24	0°01	0°01	127°90	1°34	338°43	339°1	0.89
3	-0°48	+0°90	0°01	0°01	140°10	1°33	338°08	337°1	0.82
4	1°91	-0°47	0°01	0°01	152°30	1°31	338°48	336°7	0.75
5	-3°30	-1°82	+0°01	+0°01	164°51	+1°29	339°65	337°7	0.66
6	4°58	3°11	0°01	0°01	176°72	1°27	341°61	339°9	0.57
7	5°65	4°28	+0°01	+0°01	188°94	1°26	344°43	343°4	0.47
8	6°43	5°28	0°00	0°00	201°17	1°24	348°19	348°3	0.37
9	6°83	6°05	+0°01	0°00	213°40	1°22	352°86	354°5	0.28
10	-6°79	-6°52	+0°01	0°00	225°63	+1°20	358°28	2°0	0.19
11	6°30	6°65	0°01	0°00	237°87	1°18	4°06	10°5	0.11
12	5°37	6°39	0°01	0°00	250°12	1°16	9°65	20°3	0.05
13	4°07	5°72	0°01	0°00	262°37	1°14	14°49	35°5	0.01
14	2°49	4°66	0°01	0°00	274°61	1°12	18°22	319°2	0.00
15	-0°78	-3°27	+0°01	0°00	286°86	+1°10	20°66	13°3	0.02
16	+0°93	-1°66	+0°01	0°00	299°11	+1°08	21°83	21°1	0.07

MOON, 1931.

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EPHEMERIS FOR PHYSICAL OBSERVATIONS OF THE MOON.

Date.	The Earth's Selenographic		Physical Libration.		The Sun's Selenographic		Position Angle of		Fraction Illuminated.
	Long.	Lat.	Long.	Lat.	Colong.	Lat.	Moon's Axis.	Terminator.	
Aug. 16	+0°93	-1°66	+0°01	0°00	299°11	+1°08	21°83	21°1	0·07
17	2°52	+0°06	0°01	0°00	311°35	1°06	21°79	23°4	0·14
18	3°90	1°76	0°01	0°00	323°58	1°04	20°59	22°9	0·23
19	5°01	3°31	0°02	0°00	335°81	1°02	18°27	20°5	0·34
20	5°83	4°63	0°02	0°00	348°03	1°00	14°86	16°4	0·45
21	+6°35	+5°65	+0°02	0°00	0°25	+0°98	10°47	10°8	0·56
22	6°58	6°34	0°02	0°00	12°45	0°97	5°33	4°2	0·66
23	6°55	6°68	0°02	0°00	24°66	0°95	359°82	356°9	0·76
24	6°27	6°68	0°02	0°00	36°85	0°93	354°41	349°5	0·84
25	5°76	6°35	0°02	0°00	49°04	0°92	349°53	342°2	0·91
26	+5°03	+5°72	+0°02	0°00	61°23	+0°90	345°45	334°8	0·96
27	4°11	4°84	0°02	0°00	73°41	0°88	342°29	325°0	0·99
28	3°02	3°74	0°02	0°00	85°60	0°85	340°06	275°6	1·00
29	1°78	2°50	0°02	0°00	97°78	0°83	338°68	348°4	0·99
30	+0°43	+1°15	0°02	0°00	109°96	0°80	338°11	338°9	0·97
Sept. 31	-0°98	-0°24	+0°01	0°00	122°14	+0°78	338°30	336°4	0·93
1	2°41	1°62	0°01	0°00	134°33	0°76	339°22	336°3	0·87
2	3°79	2°94	0°01	0°00	146°52	0°73	340°93	337°8	0·80
3	5°05	4°14	0°01	0°00	158°72	0°70	343°45	340°6	0·72
4	6°12	5°18	0°01	0°00	170°92	0°68	346°86	344°8	0·63
5	-6°91	-6°00	+0°01	0°00	183°12	+0°65	351°15	350°1	0·53
6	7°35	6°56	0°01	0°00	195°33	0°63	356°22	356°5	0·43
7	7°38	6°79	0°01	0°00	207°55	0°60	1°78	3°6	0·33
8	6°96	6°65	0°01	0°00	219°77	0°58	7°38	11°0	0·23
9	6°08	6°13	0°01	0°00	232°00	0°55	12°50	18°0	0·14
10	-4°78	-5°20	+0°01	0°00	244°23	+0°52	16°70	24°4	0·07
11	3°15	3°91	0°01	0°00	256°46	0°49	19°71	30°9	0·02
12	-1°28	2°32	0°01	0°00	268°70	0°47	21°46	57°1	0·00
13	+0°67	-0°56	0°02	0°00	280°93	0°44	21°94	21°4	0·01
14	2°56	+1°23	0°02	0°00	293°17	0°41	21°20	24°7	0·05
15	+4°25	+2°92	+0°02	0°00	305°40	+0°39	19°24	23°4	0·12
16	5°65	4°38	0°02	0°00	317°62	0°36	16°10	19°8	0·20
17	6°69	5°53	0°02	0°00	329°84	0°33	11°86	14°6	0·30
18	7°33	6°32	0°02	0°00	342°05	0°31	6°77	8°3	0·41
19	7°59	6°74	0°02	0°00	354°26	0°28	1°22	1°3	0·52
20	+7°48	+6°80	+0°02	0°00	6°45	+0°26	355°69	354°3	0·62
21	7°05	6°52	0°02	0°00	18°64	0°23	350°64	347°8	0·72
22	6°33	5°94	0°02	0°00	30°83	0°20	346°36	342°1	0·80
23	5°38	5°10	0°02	0°00	43°01	0°18	343°00	337°5	0·87
24	4°25	4°03	0°02	0°00	55°18	0°15	340°55	334°0	0·93
25	+2°98	+2°80	+0°02	0°00	67°36	+0°12	338°97	331°5	0·97
26	1°62	1°46	0°02	0°00	79°53	0°09	338°19	329°5	0·99
27	+0°22	+0°06	0°02	0°00	91°70	0°06	338°18	338°3	1·00
28	-1°20	-1°34	0°02	0°00	103°86	0°04	338°90	332°8	0·99
29	2°58	2°69	0°01	0°00	116°03	+0°01	340°40	334°2	0·96
30	-3°87	-3°93	+0°01	0°00	128°20	-0°02	342°70	337°0	0·91
Oct. 1	-5°04	-5°00	+0°01	0°00	140°37	-0°05	345°86	341°0	0·85

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF THE MOON.

Date.	The Earth's Selenographic		Physical Libration.		The Sun's Selenographic		Position Angle of		Fraction Illuminated.
	Long.	Lat.	Long.	Lat.	Colong.	Lat.	Moon's Axis.	Terminator.	
Oct. 1	-5°04	-5°00	+0°01	0°00	140°37	-0°05	345°86	341°0	0·85
2	6°02	5°88	0°01	0°00	152°55	0°07	349°88	346°1	0·77
3	6°76	6°49	0°01	0°00	164°73	0°10	354°68	352°2	0·69
4	7°22	6°80	0°01	0°00	176°92	0°13	0°01	358°9	0·59
5	7°33	6°77	0°01	0°00	189°11	0°15	5°50	5°9	0·48
6	-7°05	-6°38	+0°01	0°00	201°30	-0°18	10°68	12°5	0·38
7	6°37	5°62	0°01	0°00	213°51	0°21	15°13	18°2	0·27
8	5°28	4°49	0°01	0°00	225°72	0°24	18°55	22°7	0·18
9	3°83	3°04	0°01	0°00	237°93	0°26	20°81	25°4	0·10
10	2°08	-1°36	0°01	0°00	250°15	0°29	21°87	26°0	0·04
11	-0°15	+0°44	+0°02	0°00	262°37	-0°32	21°70	20°8	0·01
12	+1°83	2°22	0°02	0°00	274°59	0°35	20°28	36°5	0·00
13	3°70	3°82	0°02	0°00	286°81	0°37	17°60	26°7	0·03
14	5°33	5°13	0°02	0°00	299°02	0°40	13°69	20°5	0·09
15	6°60	6°08	0°02	0°00	311°23	0°43	8°73	13°6	0·16
16	+7°44	+6°64	+0°02	0°00	323°44	-0°46	3°11	6°3	0·26
17	7°83	6°80	0°02	0°00	335°64	0°48	357°36	358°9	0·36
18	7°77	6°60	0°02	0°00	347°83	0°51	352°02	352°0	0·46
19	7°32	6°08	0°02	0°00	0°02	0°54	347°44	346°1	0·56
20	6°52	5°28	0°02	0°00	12°19	0°57	343°80	341°4	0·66
21	+5°46	+4°26	+0°02	0°00	24°37	-0°59	341°11	338°0	0·75
22	4°21	3°08	0°02	0°00	36°53	0°62	339°31	335°8	0·83
23	2°84	1°76	0°02	0°00	48°70	0°65	338°33	335°1	0·89
24	+1°41	+0°38	0°01	0°00	60°85	0°67	338°11	335°9	0·94
25	0°00	-1°02	0°01	0°00	73°01	0°70	338°64	339°6	0·98
26	-1°36	-2°37	+0°01	0°00	85°16	-0°73	339°93	354°7	1·00
27	2°62	3°64	0°01	0°00	97°31	0°75	342°03	310°6	1·00
28	3°74	4°75	0°01	0°00	109°46	0°78	344°99	331°3	0·98
29	4°71	5°66	0°01	0°00	121°61	0°80	348°82	339°5	0·94
30	5°49	6°31	0°01	0°00	133°76	0°82	353°45	346°8	0·89
31	-6°06	-6°68	+0°01	0°00	145°92	-0°84	358°66	354°1	0·82
Nov. 1	6°40	6°72	0°01	-0°01	158°08	0°86	4°09	1°4	0·74
2	6°49	6°42	0°01	0°00	170°25	0°88	9°29	8°3	0·64
3	6°29	5°77	0°01	0°00	182°42	0°90	13°86	14°4	0·53
4	5°80	4°78	0°01	0°00	194°60	0°92	17°51	19°2	0·42
5	-4°98	-3°48	+0°01	0°00	206°78	-0°94	20°10	22°5	0·31
6	3°85	1°94	0°01	0°00	218°97	0°96	21°58	24°1	0·21
7	2°42	-0°25	0°01	0°00	231°16	0°98	21°92	23°7	0·12
8	-0°77	+1°49	0°01	0°00	243°36	1°00	21°09	20°4	0·06
9	+1°01	3°13	0°01	0°00	255°57	1°02	19°02	10°4	0·01
10	+2°79	+4°56	+0°02	0°00	267°77	-1°04	15°66	276°6	0·00
11	4°42	5°66	0°02	0°00	279°98	1°07	11°09	28°3	0·02
12	5°78	6°37	0°02	0°00	292°18	1°09	5°58	15°2	0·06
13	6°74	6°66	0°02	0°00	304°38	1°11	359°66	5°6	0·12
14	7°24	6°57	0°02	0°00	316°57	1°13	353°95	357°3	0·20
15	+7°28	+6°12	+0°02	0°00	328°76	-1°16	348°94	350°4	0·30
16	+6°88	+5°38	+0°02	-0°01	340°94	-1°18	344°89	344°8	0·39

MOON, 1931.

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EPHEMERIS FOR PHYSICAL OBSERVATIONS OF THE MOON.

Date.	The Earth's Selenographic		Physical Libration.		The Sun's Selenographic		Position Angle of		Fraction Illuminated.
	Long.	Lat.	Long.	Lat.	Colong.	Lat.	Moon's Axis.	Terminator.	
Nov. 16	+6.88	+5.38	+0.02	-0.01	340.94	-1.18	344.89	344.8	0.39
17	6.09	4.40	0.01	0.01	353.11	1.20	341.86	340.7	0.49
18	5.01	3.25	0.01	0.01	5.28	1.22	339.78	338.0	0.50
19	3.72	1.97	0.01	0.01	17.44	1.24	338.55	336.5	0.68
20	2.32	+0.62	0.01	0.01	29.60	1.26	338.10	336.2	0.76
21	+0.89	-0.75	+0.01	-0.01	41.75	-1.28	338.40	337.4	0.84
22	-0.50	2.10	0.01	0.01	53.89	1.30	339.46	340.1	0.90
23	1.76	3.36	+0.01	0.01	66.03	1.31	341.33	345.3	0.95
24	2.86	4.48	0.00	0.01	78.17	1.33	344.05	355.7	0.98
25	3.76	5.42	0.00	0.01	90.31	1.34	347.68	37.3	1.00
26	-4.45	-6.11	0.00	-0.01	102.44	-1.36	352.17	321.7	0.99
27	4.92	6.51	0.00	0.01	114.58	1.37	357.32	343.5	0.97
28	5.18	6.59	0.00	0.01	126.72	1.38	2.79	354.7	0.92
29	5.25	6.33	0.00	0.01	138.86	1.38	8.10	3.5	0.86
30	5.13	5.73	0.00	0.01	151.00	1.39	12.84	10.6	0.78
Dec. 1	-4.84	-4.80	0.00	-0.01	163.15	-1.40	16.69	16.3	0.68
2	4.36	3.60	0.00	0.01	175.30	1.40	19.50	20.3	0.58
3	3.70	2.16	0.00	0.01	187.46	1.41	21.25	22.8	0.47
4	2.83	-0.57	+0.01	0.01	199.63	1.41	21.93	23.6	0.35
5	1.76	+1.08	0.01	0.01	211.81	1.42	21.53	22.5	0.25
6	-0.50	+2.67	+0.01	-0.01	223.99	-1.43	19.98	19.4	0.16
7	+0.88	4.10	0.01	0.01	236.17	1.44	17.23	13.6	0.08
8	2.31	5.26	0.01	0.01	248.36	1.45	13.23	2.7	0.03
9	3.67	6.08	0.01	0.01	260.55	1.46	8.12	329.6	0.00
10	4.84	6.49	0.01	0.01	272.75	1.47	2.30	35.6	0.01
11	+5.70	+6.50	+0.01	-0.01	284.94	-1.48	356.37	9.2	0.03
12	6.17	6.14	0.01	0.01	297.13	1.49	350.93	357.5	0.08
13	6.22	5.46	0.01	0.01	309.31	1.50	346.39	349.6	0.15
14	5.85	4.51	0.01	0.01	321.49	1.51	342.90	344.0	0.23
15	5.09	3.38	0.01	0.01	333.67	1.52	340.43	340.1	0.32
16	+4.04	+2.11	+0.01	-0.01	345.84	-1.53	338.89	337.7	0.41
17	2.76	+0.77	0.00	0.01	358.00	1.54	338.17	336.6	0.51
18	+1.36	-0.59	0.00	0.01	10.16	1.54	338.22	336.8	0.60
19	-0.06	1.92	0.00	0.01	22.31	1.55	339.02	338.1	0.69
20	1.40	3.18	0.00	0.01	34.45	1.56	340.60	340.8	0.77
21	-2.59	-4.31	0.00	-0.01	46.59	-1.56	343.03	345.0	0.85
22	3.56	5.26	0.00	0.01	58.73	1.56	346.36	351.2	0.91
23	4.26	5.98	0.00	0.01	70.86	1.56	350.60	0.4	0.96
24	4.67	6.42	0.00	0.01	82.99	1.56	355.62	17.7	0.99
25	4.80	6.54	0.00	0.01	95.11	1.56	1.12	274.7	1.00
26	-4.68	-6.31	-0.01	-0.01	107.24	-1.55	6.62	346.3	0.99
27	4.35	5.74	0.00	0.01	119.37	1.54	11.64	3.1	0.95
28	3.86	4.82	0.00	0.01	131.50	1.53	15.80	12.1	0.90
29	3.26	3.62	0.00	0.01	143.63	1.52	18.91	17.9	0.82
30	2.57	2.20	0.00	0.01	155.77	1.51	20.92	21.5	0.73
31	-1.81	-0.63	0.00	-0.01	167.92	-1.50	21.86	23.2	0.62
32	-0.99	+0.98	0.00	-0.01	180.07	-1.49	21.74	23.2	0.51

ILLUMINATED DISC OF MERCURY.

Date.	k	i	θ	L	Stellar Mag.	Date.	k	i	θ	L	Stellar Mag.
Jan. 1	0.107	142 ⁰	345 ⁰	24.2	+1.4	July 5	0.969	20 ⁰	352 ⁰	57.5	-1.4
6	0.006	171	271	1.4	2.7	10	0.906	36	3	48.8	0.9
11	0.093	144	193	19.5	1.6	15	0.833	48	9	41.7	0.5
16	0.271	117	186	39.8	0.7	20	0.761	59	14	36.8	-0.2
21	0.439	97	183	44.0	0.3	25	0.692	67	18	33.8	+0.1
26	0.569	82	179	40.6	+0.2	30	0.625	75	21	32.3	+0.3
31	0.665	71	175	35.9	+0.1	Aug. 4	0.556	84	23	31.7	0.5
Feb. 5	0.737	62	171	32.0	0.0	9	0.482	92	26	31.6	0.6
10	0.793	54	167	29.3	0.0	14	0.399	102	28	31.4	0.8
15	0.838	48	162	27.9	-0.1	19	0.303	113	31	29.7	1.0
20	0.876	41	158	27.5	-0.2	24	0.196	127	35	24.4	+1.4
25	0.910	35	154	28.3	0.4	29	0.090	145	42	14.1	1.9
Mar. 2	0.941	28	149	30.4	0.6	Sept. 3	0.017	165	69	3.2	2.7
7	0.969	20	143	34.2	0.8	8	0.025	162	173	4.9	2.5
12	0.991	11	131	40.1	1.2	13	0.140	136	195	25.8	1.3
17	0.998	5	32	48.6	-1.5	18	0.342	108	202	52.3	+0.3
22	0.974	19	343	59.2	1.5	23	0.572	82	206	67.4	-0.4
27	0.895	38	336	68.6	1.3	28	0.766	58	209	66.1	0.8
Apr. 1	0.751	60	334	70.6	0.9	Oct. 3	0.893	38	212	56.1	1.0
6	0.566	82	334	62.6	-0.3	8	0.961	23	216	45.3	1.1
11	0.380	104	333	48.2	+0.4	13	0.991	11	221	37.0	-1.1
16	0.220	124	333	31.8	1.0	18	1.000	2	263	31.4	1.1
21	0.098	144	331	15.9	1.8	23	0.997	7	13	27.7	0.9
26	0.022	163	326	3.9	2.7	28	0.987	13	20	25.7	0.7
May 1	0.000	177	196	0.1	3.4	Nov. 2	0.972	19	21	24.9	0.5
6	0.030	160	156	4.9	+2.6	7	0.952	25	20	25.2	-0.4
11	0.094	144	153	13.7	2.0	12	0.925	32	18	26.6	0.4
16	0.177	130	152	21.8	1.5	17	0.889	39	16	29.4	0.3
21	0.265	118	153	27.7	1.1	22	0.839	47	13	33.7	0.3
26	0.355	107	154	32.0	0.8	27	0.766	58	9	40.0	0.3
31	0.447	96	156	35.9	+0.5	Dec. 2	0.659	71	6	47.8	-0.2
June 5	0.546	85	158	40.4	+0.2	7	0.502	90	3	54.1	0.0
10	0.654	72	161	46.4	-0.2	12	0.292	115	0	48.0	+0.5
15	0.770	57	166	54.1	0.6	17	0.081	147	354	18.8	1.6
20	0.885	40	172	62.4	1.1	22	0.006	171	238	1.4	2.7
25	0.970	20	184	67.3	-1.6	27	0.127	138	197	26.1	+1.3
30	0.999	4	283	65.3	-1.8	32	0.327	110	193	46.0	+0.5

NOTATION.

k =the ratio of the area of the illuminated portion of the apparent disc to the area of the entire apparent disc regarded as circular.

i =the angle between the Sun and Earth, as seen from the planet.

θ =the angle which the line joining the cusps, or extremities of the illuminated portion, makes with the meridian.

L =the brilliancy of the disc. The unit of L is the amount of light received by an eye from a circular disc with the same albedo as the planet, subtending an angular radius of one second of arc, situated at distance unity from the Sun, and illuminated by the latter as the mean disc of the planet is illuminated.

VENUS, 1931.

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ILLUMINATED DISC OF VENUS.

Date.	k	i	θ	L	Stellar Mag.	Date.	k	i	θ	L	Stellar Mag.
Jan. 1	0.291	114.8	197.2	210.6	-4.4	July 5	0.952	25.3	176.2	49.2	-3.3
6	0.330	109.9	195.9	204.7	4.3	10	0.959	23.4	179.4	48.6	3.3
11	0.366	105.5	194.4	195.7	4.3	15	0.965	21.4	182.7	48.2	3.3
16	0.400	101.5	192.6	185.5	4.2	20	0.971	19.5	186.2	47.7	3.3
21	0.432	97.8	190.7	174.9	4.2	25	0.977	17.6	189.7	47.4	3.4
26	0.461	94.4	188.5	164.5	-4.2	30	0.982	15.6	193.3	47.0	-3.4
31	0.489	91.2	186.3	154.6	4.1	Aug. 4	0.986	13.7	197.1	46.8	3.4
Feb. 5	0.515	88.2	183.9	145.1	4.0	9	0.990	11.7	201.0	46.5	3.4
10	0.540	85.4	181.4	136.4	4.0	14	0.993	9.8	205.3	46.3	3.4
15	0.563	82.7	178.8	128.4	3.9	19	0.995	7.9	210.3	46.2	3.4
20	0.586	80.1	176.2	121.0	-3.9	24	0.997	6.1	216.9	46.0	-3.5
25	0.607	77.7	173.7	114.2	3.8	29	0.999	4.3	226.9	46.0	3.5
Mar. 2	0.627	75.3	171.1	108.0	3.8	Sept. 3	0.999	2.8	246.7	45.9	3.5
7	0.647	73.0	168.7	102.4	3.7	8	1.000	2.0	290.8	45.9	3.5
12	0.665	70.7	166.4	97.2	3.7	13	0.999	2.7	336.1	45.9	3.5
17	0.683	68.5	164.2	92.4	-3.7	18	0.999	4.2	356.1	45.9	-3.5
22	0.700	66.4	162.2	88.1	3.6	23	0.997	5.9	5.2	46.0	3.5
27	0.717	64.3	160.4	84.2	3.6	28	0.996	7.6	10.2	46.1	3.4
Apr. 1	0.733	62.2	158.8	80.6	3.6	Oct. 3	0.993	9.4	13.1	46.3	3.4
6	0.748	60.2	157.4	77.3	3.5	8	0.991	11.1	14.8	46.5	3.4
11	0.764	58.2	156.3	74.2	-3.5	13	0.988	12.9	15.8	46.8	-3.4
16	0.778	56.2	155.4	71.5	3.5	18	0.984	14.6	16.1	47.0	3.4
21	0.792	54.3	154.7	68.9	3.4	23	0.980	16.3	15.9	47.4	3.4
26	0.806	52.3	154.4	66.6	3.4	28	0.976	18.0	15.3	47.7	3.4
May 1	0.819	50.4	154.2	64.5	3.4	Nov. 2	0.971	19.7	14.3	48.2	3.4
6	0.832	48.5	154.4	62.6	-3.4	7	0.966	21.4	13.0	48.6	-3.3
11	0.844	46.5	154.8	60.8	3.4	12	0.960	23.1	11.4	49.2	3.3
16	0.856	44.6	155.4	59.2	3.3	17	0.954	24.8	9.5	49.8	3.3
21	0.867	42.7	156.4	57.7	3.3	22	0.948	26.5	7.4	50.4	3.3
26	0.878	40.8	157.6	56.3	3.3	27	0.941	28.1	5.1	51.1	3.3
31	0.889	38.9	159.0	55.1	-3.3	Dec. 2	0.934	29.8	2.7	51.9	-3.3
June 5	0.900	36.9	160.8	54.0	3.3	7	0.926	31.5	0.2	52.8	3.3
10	0.910	35.0	162.8	53.0	3.3	12	0.919	33.1	357.7	53.7	3.3
15	0.919	33.1	165.0	52.0	3.3	17	0.911	34.8	355.2	54.8	3.3
20	0.928	31.2	167.5	51.2	3.3	22	0.902	36.5	352.7	55.9	3.4
25	0.936	29.2	170.2	50.5	-3.3	27	0.893	38.2	350.4	57.1	-3.4
30	0.944	27.3	173.1	49.8	-3.3	32	0.883	40.0	348.2	58.4	-3.4

NOTATION.

k =the ratio of the area of the illuminated portion of the apparent disc to the area of the entire apparent disc regarded as circular.

i =the angle between the Sun and Earth, as seen from the planet.

θ =the angle which the line joining the cusps, or extremities of the illuminated portion, makes with the meridian.

L =the brilliancy of the disc. The unit of L is the amount of light received by an eye from a circular disc with the same albedo as the planet, subtending an angular radius of one second of arc, situated at distance unity from the Sun, and illuminated by the latter as the mean disc of the planet is illuminated.

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF MARS.

Date.	Light Time.	Stellar Magnitude.	P	$A_{\odot} + 180^{\circ}$	D_{\odot}	$A_{\odot} - A_{\oplus}$	D_{\odot}	$\odot \delta$
Jan. 1	^m 6.03	-0.6	^o 0.95	^o 225.62	^o +15.62	^o -20.83	^o +10.57	^o 26.82
3	5.95	0.7	0.72	225.26	15.43	19.60	10.90	27.74
5	5.88	0.7	0.47	224.84	15.23	18.32	11.24	28.65
7	5.81	0.8	0.18	224.37	15.01	16.98	11.57	29.56
9	5.75	0.8	359.86	223.86	14.78	15.60	11.89	30.47
11	5.70	-0.8	359.51	223.30	+14.54	-14.17	+12.22	31.38
13	5.65	0.9	359.14	222.69	14.29	12.70	12.54	32.28
15	5.61	0.9	358.74	222.05	14.03	11.19	12.85	33.18
17	5.57	1.0	358.31	221.37	13.76	9.64	13.17	34.09
19	5.54	1.0	357.87	220.67	13.49	8.07	13.48	34.99
21	5.52	-1.0	357.41	219.94	+13.21	-6.47	+13.78	35.89
23	5.51	1.0	356.94	219.19	12.93	4.85	14.09	36.78
25	5.50	1.1	356.45	218.43	12.65	3.22	14.39	37.68
27	5.50	1.1	355.97	217.66	12.37	-1.58	14.68	38.58
29	5.51	1.1	355.48	216.89	12.10	+0.07	14.97	39.47
31	5.53	-1.0	355.00	216.13	+11.83	+1.70	+15.26	40.36
Feb. 2	5.55	1.0	354.52	215.38	11.57	3.33	15.55	41.25
4	5.59	1.0	354.05	214.64	11.32	4.94	15.83	42.14
6	5.62	0.9	353.59	213.93	11.09	6.53	16.10	43.03
8	5.67	0.9	353.16	213.25	10.86	8.10	16.38	43.92
10	5.72	-0.8	352.74	212.59	+10.65	+9.64	+16.64	44.81
12	5.78	0.8	352.35	211.97	10.46	11.14	16.91	45.69
14	5.85	0.8	351.97	211.39	10.29	12.60	17.17	46.58
16	5.92	0.7	351.63	210.85	10.13	14.03	17.43	47.46
18	6.00	0.7	351.32	210.35	10.00	15.41	17.68	48.34
20	6.08	-0.6	351.03	209.90	+9.88	+16.75	+17.93	49.23
22	6.17	0.6	350.78	209.50	9.79	18.05	18.17	50.11
24	6.27	0.5	350.56	209.14	9.72	19.30	18.41	50.99
26	6.37	0.5	350.36	208.84	9.67	20.49	18.64	51.87
28	6.47	0.4	350.21	208.58	9.64	21.64	18.88	52.74
Mar. 2	6.58	-0.4	350.08	208.38	+9.63	+22.75	+19.10	53.62
4	6.70	0.3	349.99	208.22	9.64	23.80	19.32	54.50
6	6.81	0.2	349.92	208.11	9.67	24.81	19.54	55.38
8	6.94	0.2	349.89	208.05	9.72	25.78	19.75	56.25
10	7.06	0.1	349.88	208.03	9.79	26.70	19.96	57.13
12	7.19	-0.1	349.91	208.06	+9.88	+27.58	+20.16	58.00
14	7.32	0.0	349.96	208.13	9.98	28.41	20.36	58.88
16	7.45	0.0	350.04	208.25	10.10	29.21	20.56	59.75
18	7.58	+0.1	350.15	208.41	10.23	29.96	20.74	60.63
20	7.72	0.1	350.28	208.60	10.38	30.68	20.93	61.50
22	7.86	+0.2	350.43	208.84	+10.55	+31.35	+21.11	62.38
24	8.00	0.2	350.61	209.12	10.73	32.00	21.28	63.25
26	8.15	0.3	350.82	209.43	10.92	32.60	21.45	64.12
28	8.29	0.3	351.04	209.78	11.12	33.17	21.61	64.99
30	8.44	0.3	351.29	210.16	11.33	33.71	21.77	65.87
Apr. 1	8.58	+0.4	351.56	210.58	+11.56	+34.22	+21.92	66.74
3	8.73	+0.4	351.84	211.03	+11.79	+34.71	+22.07	67.61

MARS, 1931.

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF MARS.

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Date.	h	Dia- meter.	i	q	Q	Central Meridian		G.M.T. of Transit of Zero Meridian	
						Of Date.	Of Inter- mediate Date.	Of Date.	Of Inter- mediate Date.
Jan. 1	0.967	12.90	20.89	0.42	282.39	308.20	299.28	^h 03 ^m 32.5	^h 04 ^m 09.1
3	0.971	13.06	19.60	0.38	281.68	290.37	281.47	04 45.6	05 22.1
5	0.975	13.22	18.26	0.33	280.86	272.59	263.71	05 58.5	06 34.9
7	0.979	13.38	16.88	0.29	279.90	254.85	246.00	07 11.2	07 47.4
9	0.982	13.52	15.45	0.24	278.76	237.17	228.34	08 23.7	08 59.8
11	0.985	13.65	13.98	0.20	277.39	219.53	210.72	09 36.0	10 12.1
13	0.988	13.77	12.48	0.16	275.70	201.93	193.14	10 48.1	11 24.1
15	0.991	13.87	10.94	0.13	273.58	184.36	175.60	12 00.1	12 36.0
17	0.993	13.96	9.40	0.10	270.81	166.83	158.08	13 11.9	13 47.8
19	0.995	14.03	7.84	0.07	267.01	149.33	140.59	14 23.6	14 59.5
21	0.997	14.08	6.32	0.04	261.45	131.85	123.12	15 35.3	16 11.1
23	0.998	14.12	4.85	0.02	252.59	114.38	105.66	16 46.9	17 22.6
25	0.999	14.14	3.58	0.01	237.06	96.93	88.21	17 58.4	18 34.2
27	0.999	14.13	2.77	0.01	209.37	79.48	70.76	19 09.9	19 45.7
29	0.999	14.11	2.88	0.01	174.19	62.03	53.31	20 21.5	20 57.3
31	0.999	14.07	3.81	0.02	149.43	44.58	35.84	21 33.1	22 08.9
Feb. 2	0.998	14.00	5.12	0.03	135.73	27.10	18.36	22 44.7	23 20.6
4	0.997	13.93	6.58	0.05	127.76	9.61	0.86	23 56.5	.. ..
6	0.995	13.83	8.09	0.07	122.64	352.10	343.33	00 32.4	01 08.3
8	0.993	13.72	9.61	0.10	119.07	334.56	325.78	01 44.3	02 20.3
10	0.991	13.59	11.11	0.13	116.42	316.99	308.19	02 56.4	03 32.5
12	0.988	13.45	12.59	0.16	114.35	299.38	290.56	04 08.6	04 44.8
14	0.985	13.30	14.04	0.20	112.70	281.73	272.89	05 21.0	05 57.3
16	0.982	13.14	15.44	0.24	111.33	264.04	255.17	06 33.6	07 09.9
18	0.979	12.96	16.81	0.28	110.18	246.30	237.41	07 46.3	08 22.8
20	0.975	12.78	18.13	0.32	109.20	228.51	219.60	08 59.3	09 35.9
22	0.972	12.60	19.40	0.36	108.35	210.68	201.74	10 12.5	10 49.2
24	0.968	12.41	20.61	0.40	107.61	192.79	183.83	11 25.9	12 02.7
26	0.964	12.21	21.78	0.44	106.96	174.86	165.87	12 39.5	13 16.4
28	0.961	12.01	22.89	0.47	106.40	156.87	147.86	13 53.4	14 30.4
Mar. 2	0.957	11.81	23.95	0.51	105.91	138.83	129.80	15 07.4	15 44.6
4	0.953	11.61	24.96	0.54	105.48	120.75	111.68	16 21.7	16 58.9
6	0.950	11.41	25.92	0.57	105.11	102.61	93.52	17 36.2	18 13.5
8	0.946	11.22	26.82	0.60	104.79	84.43	75.32	18 50.9	19 28.3
10	0.943	11.02	27.68	0.63	104.51	66.20	57.07	20 05.8	20 43.3
12	0.939	10.82	28.50	0.66	104.28	47.92	38.77	21 20.9	21 58.5
14	0.936	10.63	29.26	0.68	104.09	29.60	20.42	22 36.2	23 13.9
16	0.933	10.44	29.98	0.70	103.93	11.24	2.04	23 51.6	.. ..
18	0.930	10.25	30.66	0.72	103.81	352.83	343.61	00 29.4	01 07.3
20	0.927	10.07	31.29	0.73	103.71	334.38	325.14	01 45.2	02 23.1
22	0.925	9.89	31.88	0.75	103.65	315.89	306.63	03 01.1	03 39.1
24	0.922	9.72	32.44	0.76	103.61	297.37	288.09	04 17.2	04 55.3
26	0.920	9.55	32.95	0.77	103.60	278.80	269.51	05 33.4	06 11.6
28	0.917	9.38	33.42	0.78	103.61	260.20	250.89	06 49.8	07 28.1
30	0.915	9.22	33.87	0.78	103.64	241.57	232.24	08 06.3	08 44.7
Apr. 1	0.913	9.06	34.28	0.79	103.68	222.90	213.56	09 23.0	10 01.4
3	0.911	8.90	34.66	0.79	103.75	204.20	194.84	10 39.8	11 18.3

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF MARS.

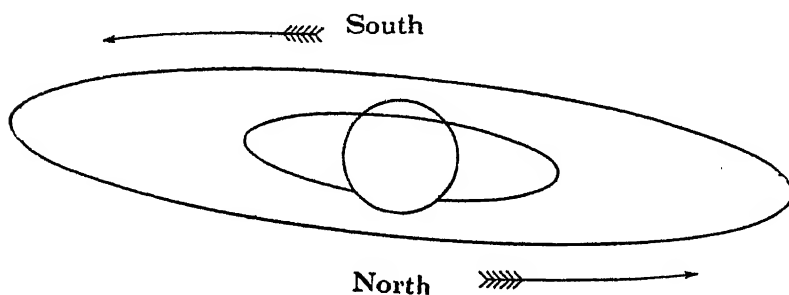
Date.	Light Time.	Stellar Magnitude.	P	$A_{\oplus} + 180^{\circ}$	D_{\oplus}	$A_{\odot} - A_{\oplus}$	D_{\odot}	\odot_{δ}
Apr.	1 ^m 8.58	+0.4	351.56	210.58	+11.56	+34.22	+21.92	66.74
	3 8.73	0.4	351.84	211.03	11.79	34.71	22.07	67.61
	5 8.88	0.5	352.15	211.50	12.03	35.16	22.22	68.49
	7 9.03	0.5	352.47	212.01	12.28	35.58	22.36	69.36
	9 9.18	0.6	352.81	212.54	12.54	35.98	22.49	70.23
	11 9.34	+0.6	353.17	213.11	+12.81	+36.36	+22.62	71.11
	13 9.49	0.6	353.54	213.69	13.08	36.71	22.74	71.98
	15 9.64	0.7	353.93	214.31	13.36	37.03	22.85	72.85
	17 9.79	0.7	354.33	214.95	13.64	37.34	22.96	73.73
	19 9.94	0.8	354.75	215.61	13.93	37.62	23.07	74.60
	21 10.10	+0.8	355.18	216.29	+14.22	+37.88	+23.17	75.48
	23 10.25	0.8	355.63	217.00	14.52	38.11	23.26	76.35
	25 10.40	0.8	356.08	217.73	14.82	38.33	23.35	77.23
	27 10.55	0.9	356.55	218.48	15.12	38.53	23.44	78.10
	29 10.71	0.9	357.03	219.26	15.42	38.71	23.51	78.98
May	1 10.86	+0.9	357.52	220.05	+15.73	+38.87	+23.58	79.86
	3 11.01	1.0	358.02	220.86	16.04	39.02	23.65	80.74
	5 11.16	1.0	358.53	221.68	16.34	39.15	23.71	81.61
	7 11.31	1.0	359.05	222.53	16.65	39.26	23.76	82.49
	9 11.46	1.1	359.58	223.40	16.96	39.36	23.81	83.37
	11 11.61	+1.1	0.12	224.28	+17.26	+39.44	+23.85	84.25
	13 11.76	1.1	0.67	225.18	17.57	39.50	23.89	85.13
	15 11.90	1.1	1.22	226.09	17.87	39.55	23.92	86.02
	17 12.05	1.2	1.78	227.02	18.17	39.59	23.94	86.90
	19 12.19	1.2	2.35	227.97	18.47	39.60	23.96	87.78
	21 12.34	+1.2	2.93	228.93	+18.77	+39.61	+23.98	88.67
	23 12.48	1.2	3.52	229.91	19.06	39.60	23.98	89.56
	25 12.63	1.2	4.10	230.91	19.35	39.58	23.98	90.44
	27 12.77	1.3	4.70	231.92	19.64	39.54	23.98	91.33
	29 12.91	1.3	5.30	232.94	19.92	39.49	23.96	92.22
June	31 13.05	+1.3	5.91	233.98	+20.20	+39.43	+23.94	93.11
	2 13.19	1.3	6.52	235.02	20.47	39.36	23.92	94.00
	4 13.32	1.4	7.14	236.09	20.74	39.27	23.89	94.90
	6 13.46	1.4	7.76	237.16	21.00	39.17	23.85	95.79
	8 13.60	1.4	8.38	238.26	21.26	39.06	23.81	96.69
	10 13.73	+1.4	9.01	239.36	+21.51	+38.94	+23.76	97.59
	12 13.86	1.4	9.64	240.47	21.75	38.80	23.70	98.49
	14 13.99	1.4	10.27	241.60	21.99	38.66	23.64	99.39
	16 14.12	1.4	10.91	242.74	22.22	38.50	23.57	100.29
	18 14.25	1.5	11.55	243.90	22.44	38.32	23.50	101.19
	20 14.38	+1.5	12.19	245.06	+22.66	+38.14	+23.42	102.10
	22 14.50	1.5	12.83	246.24	22.86	37.95	23.33	103.00
	24 14.63	1.5	13.47	247.42	23.06	37.74	23.24	103.91
	26 14.75	1.5	14.12	248.62	23.25	37.53	23.14	104.82
	28 14.87	1.5	14.76	249.83	23.43	37.31	23.03	105.74
July	30 14.99	+1.6	15.41	251.05	+23.60	+37.07	+22.92	106.65
	2 15.11	+1.6	16.05	252.28	+23.76	+36.83	+22.80	107.57

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF MARS.

Date.	<i>h</i>	Dia- meter.	<i>i</i>	<i>q</i>	<i>Q</i>	Central Meridian		G.M.T. of Transit of Zero Meridian	
						Of Date.	Of Inter- mediate Date.	Of Date.	Of Inter- mediate Date.
Apr. 1	0.913	9.06	34.28	0.79	103.68	222.90	213.56	^h 09 ^m 23.0	^h 10 ^m 01.4
3	0.911	8.90	34.66	0.79	103.75	204.20	194.84	10 39.8	11 18.3
5	0.909	8.76	35.01	0.79	103.84	185.47	176.10	11 56.8	12 35.3
7	0.908	8.61	35.33	0.79	103.94	166.71	157.32	13 13.8	13 52.4
9	0.906	8.47	35.62	0.79	104.05	147.93	138.52	14 31.0	15 09.7
11	0.905	8.33	35.89	0.79	104.18	129.11	119.70	15 48.4	16 27.1
13	0.904	8.20	36.13	0.79	104.32	110.27	100.84	17 05.8	17 44.5
15	0.903	8.07	36.35	0.78	104.46	91.40	81.96	18 23.3	19 02.1
17	0.902	7.94	36.54	0.78	104.62	72.51	63.06	19 41.0	20 19.8
19	0.901	7.82	36.71	0.78	104.79	53.60	44.13	20 58.7	21 37.6
21	0.900	7.70	36.86	0.77	104.97	34.66	25.18	22 16.6	22 55.5
23	0.899	7.59	36.99	0.76	105.16	15.70	6.21	23 34.5	.. ..
25	0.899	7.48	37.10	0.76	105.35	356.71	347.21	00 13.5	00 52.5
27	0.898	7.37	37.19	0.75	105.54	337.71	328.20	01 31.6	02 10.6
29	0.898	7.26	37.26	0.74	105.74	318.68	309.16	02 49.8	03 28.9
May 1	0.898	7.16	37.32	0.73	105.95	299.64	290.11	04 08.0	04 47.2
3	0.897	7.07	37.36	0.72	106.16	280.58	271.04	05 26.3	06 05.5
5	0.897	6.97	37.39	0.72	106.38	261.50	251.95	06 44.8	07 24.0
7	0.897	6.88	37.40	0.71	106.59	242.40	232.84	08 03.2	08 42.5
9	0.897	6.79	37.40	0.70	106.81	223.28	213.72	09 21.8	10 01.1
11	0.897	6.70	37.39	0.69	107.03	204.15	194.58	10 40.4	11 19.8
13	0.897	6.62	37.36	0.68	107.25	185.00	175.42	11 59.2	12 38.5
15	0.898	6.53	37.32	0.67	107.47	165.83	156.24	13 17.9	13 57.4
17	0.898	6.46	37.27	0.66	107.69	146.65	137.05	14 36.8	15 16.2
19	0.898	6.38	37.21	0.65	107.91	127.45	117.84	15 55.7	16 35.2
21	0.899	6.30	37.13	0.64	108.13	108.23	98.62	17 14.7	17 54.2
23	0.899	6.23	37.05	0.63	108.35	89.00	79.38	18 33.8	19 13.3
25	0.900	6.16	36.95	0.62	108.57	69.76	60.13	19 52.9	20 32.4
27	0.900	6.09	36.85	0.61	108.78	50.50	40.86	21 12.0	21 51.6
29	0.901	6.02	36.74	0.60	108.99	31.22	21.58	22 31.3	23 10.9
June 31	0.901	5.96	36.62	0.59	109.20	11.94	2.30	23 50.6	.. ..
2	0.902	5.90	36.49	0.58	109.41	352.64	342.99	00 30.2	01 09.9
4	0.903	5.84	36.35	0.57	109.61	333.33	323.67	01 49.6	02 29.4
6	0.903	5.78	36.21	0.56	109.81	314.00	304.33	03 09.1	03 48.8
8	0.904	5.72	36.06	0.55	110.01	294.66	284.99	04 28.6	05 08.3
10	0.905	5.66	35.90	0.54	110.20	275.31	265.63	05 48.1	06 27.9
12	0.906	5.61	35.73	0.53	110.39	255.95	246.26	07 07.7	07 47.5
14	0.907	5.56	35.56	0.52	110.57	236.57	226.88	08 27.4	09 07.2
16	0.908	5.51	35.38	0.51	110.75	217.18	207.48	09 47.1	10 27.0
18	0.909	5.46	35.20	0.50	110.92	197.78	188.08	11 06.8	11 46.8
20	0.910	5.41	35.00	0.49	111.09	178.37	168.66	12 26.7	13 06.6
22	0.910	5.36	34.81	0.48	111.25	158.95	149.23	13 46.5	14 26.5
24	0.912	5.32	34.60	0.47	111.41	139.51	129.79	15 06.4	15 46.4
26	0.913	5.27	34.40	0.46	111.56	120.07	110.34	16 26.4	17 06.4
28	0.914	5.23	34.19	0.45	111.70	100.61	90.88	17 46.4	18 26.4
July 30	0.915	5.19	33.97	0.44	111.84	81.15	71.41	19 06.4	19 46.4
2	0.916	5.15	33.75	0.43	111.97	61.68	51.94	20 26.5	21 06.5

SATELLITES OF MARS, 1931.

APPARENT ORBITS OF THE SATELLITES OF MARS AT DATE OF
OPPOSITION, 1931 JANUARY 27, AS SEEN IN AN INVERTING
TELESCOPE.



GREENWICH MEAN TIME OF GREATEST ELONGATION.

PHOBOS.			DEIMOS.		
Jan.	d h	Jan.	d h	Feb.	d h
0 00.1 E.		24 13.3 E.	1 03.1 E.	11 17.8 E.	
1 02.9 W.		25 16.1 W.	3 00.5 W.	13 15.2 W.	
2 05.7 E.		26 18.9 E.	4 21.9 E.	15 12.6 E.	
3 08.5 W.		27 21.7 W.	6 19.4 W.	17 10.1 W.	
4 11.3 E.		29 00.4 E.	8 16.8 E.	19 07.5 E.	
5 14.0 W.		30 03.2 W.	10 14.2 W.	21 04.9 W.	
6 16.8 E.		31 06.0 E.	12 11.6 E.	23 02.3 E.	
7 19.6 W.	Feb.	1 08.8 W.	14 09.0 W.	24 23.7 W.	
8 22.4 E.		2 11.6 E.	16 06.4 E.	26 21.2 E.	
10 01.2 W.		3 14.3 W.	18 03.8 W.	28 18.6 W.	
11 04.0 E.		4 17.1 E.	20 01.1 E.	Mar. 2 16.0 E.	
12 06.8 W.		5 19.9 W.	21 22.5 W.	4 13.5 W.	
13 09.5 E.		6 22.7 E.	23 19.9 E.	6 10.9 E.	
14 12.3 W.		8 01.5 W.	25 17.3 W.	8 08.4 W.	
15 15.1 E.		9 04.2 E.	27 14.7 E.	10 05.8 E.	
16 17.9 W.		10 07.0 W.	29 12.1 W.	12 03.3 W.	
17 20.6 E.		11 09.8 E.	31 09.5 E.	14 00.7 E.	
18 23.4 W.		12 12.6 W.	Feb. 2 06.9 W.	15 22.2 W.	
20 02.2 E.		13 15.4 E.	4 04.3 E.	17 19.6 E.	
21 05.0 W.		14 18.2 W.	6 01.6 W.	19 17.1 W.	
22 07.8 E.		15 20.9 E.	7 23.0 E.	21 14.6 E.	
23 10.6 W.		16 23.7 W.	9 20.4 W.	23 12.0 W.	
		Feb. 18 02.5 E.			
		19 05.3 W.			
		20 08.1 E.			
		21 10.9 W.			
		22 13.6 E.			
		23 16.4 W.			
		24 19.2 E.			
		25 22.0 W.			
		27 00.8 E.			
		28 03.6 W.			
		Mar. 1 06.4 E.			
		2 09.2 W.			
		3 11.9 E.			
		4 14.7 W.			
		5 17.5 E.			
		6 20.3 W.			
		7 23.1 E.			
		9 01.9 W.			
		10 04.7 E.			
		11 07.5 W.			
		12 10.2 E.			
		13 13.0 W.			

For Phobos every seventh eastern and western elongation is given, and for Deimos every third; intermediate ones may be found by adding the following multiples of the period of the satellite.

PHOBOS.			DEIMOS.		
1	d h		5	d h	
1	0 07.7	3	0 23.0	1	1 14.3
2	0 15.3	4	1 06.6	6	1 21.9
				1	2 12.6

Sidereal period of Phobos, 7^h 39^m 13^s.85. Sidereal period of Deimos, 30^h 17^m 54^s.87.

SATELLITES OF MARS, 1931.

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Time from Eastern Elongation	Phobos.		Time from Eastern Elongation	Deimos.		Date.	Phobos.		Deimos.	
	p^1	F		p^1	F		$P-P_0$	$\frac{\alpha(P)}{P}$	$P-P_0$	$\frac{\alpha(P)}{P}$
h m	86°	1.000	h m	86°	1.000	Jan. 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 Feb. 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20	$^{\circ}$	$''$	$^{\circ}$	$''$
0 00	86.0	1.000	0 00	86.0	1.000		+4.5	17.8	+5.0	44.6
0 10	88.0	0.991	0 40	87.6	0.991		4.4	17.9	4.9	44.9
0 20	90.1	0.965	1 20	89.3	0.964		4.3	18.1	4.8	45.2
0 30	92.4	0.923	2 00	91.2	0.919		4.2	18.2	4.7	45.5
0 40	94.9	0.864	2 40	93.2	0.858		4.0	18.3	4.6	45.7
0 50	97.8	0.792	3 20	95.6	0.782		+3.9	18.4	+4.4	46.0
1 00	101.4	0.707	4 00	98.6	0.692		3.7	18.5	4.3	46.3
1 10	106.0	0.612	4 40	102.6	0.592		3.6	18.6	4.1	46.5
1 20	112.4	0.512	5 20	108.3	0.484		3.4	18.7	3.9	46.8
1 30	122.0	0.412	6 00	117.2	0.375		3.2	18.8	3.8	47.0
1 40	137.3	0.322	6 40	133.1	0.275		+3.0	18.9	+3.6	47.2
1 50	161.6	0.264	7 20	162.3	0.211		2.8	19.0	3.4	47.4
2 00	191.5	0.266	8 00	199.3	0.222		2.6	19.0	3.2	47.6
2 10	215.4	0.325	8 40	224.3	0.300		2.4	19.1	3.0	47.8
2 20	230.4	0.415	9 20	237.7	0.405		2.2	19.2	2.8	48.0
2 30	239.8	0.516	10 00	245.5	0.514		+2.0	19.2	+2.6	48.1
2 40	246.3	0.616	10 40	250.6	0.620		1.8	19.3	2.4	48.3
2 50	250.8	0.710	11 20	254.3	0.718		1.6	19.4	2.2	48.4
3 00	254.3	0.795	12 00	257.1	0.804		1.3	19.4	2.0	48.5
3 10	257.2	0.867	12 40	259.4	0.876		1.1	19.4	1.8	48.6
3 20	259.7	0.925	13 20	261.4	0.933		+0.8	19.5	+1.5	48.7
3 30	262.0	0.966	14 00	263.1	0.973		0.6	19.5	1.3	48.8
3 40	264.1	0.992	14 40	264.8	0.995		0.4	19.5	1.0	48.8
3 50	266.1	1.000	15 20	266.4	0.999		+0.1	19.5	0.8	48.9
4 00	268.1	0.991	16 00	268.1	0.985		-0.2	19.5	0.6	48.9
4 10	270.2	0.964	16 40	269.8	0.953		-0.4	19.5	+0.3	48.9
4 20	272.5	0.921	17 20	271.7	0.904		0.6	19.5	+0.1	48.9
4 30	275.0	0.862	18 00	273.8	0.838		0.9	19.5	-0.2	48.8
4 40	277.9	0.789	18 40	276.4	0.758		1.2	19.5	0.4	48.8
4 50	281.6	0.704	19 20	279.6	0.665		1.4	19.5	0.6	48.7
5 00	286.2	0.609	20 00	283.9	0.562		-1.7	19.4	-0.9	48.7
5 10	292.7	0.508	20 40	290.3	0.454	Feb. 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20	1.9	19.4	1.1	48.6
5 20	302.5	0.408	21 20	300.7	0.346		2.2	19.4	1.4	48.4
5 30	318.1	0.319	22 00	319.6	0.252		2.4	19.3	1.6	48.3
5 40	342.7	0.263	22 40	352.7	0.205		2.7	19.3	1.8	48.2
5 50	12.6	0.267	23 20	27.8	0.239		-2.9	19.2	-2.0	48.0
6 00	36.1	0.328	24 00	48.9	0.328		3.1	19.1	2.3	47.8
6 10	50.9	0.419	24 40	60.3	0.435		3.4	19.1	2.5	47.7
6 20	60.1	0.520	25 20	67.2	0.544		3.6	19.0	2.7	47.5
6 30	66.4	0.620	26 00	71.7	0.648		3.8	18.9	2.9	47.2
6 40	70.9	0.714	26 40	75.1	0.743		-4.0	18.8	-3.1	47.0
6 50	74.4	0.798	27 20	77.8	0.825		4.2	18.7	3.3	46.8
7 00	77.3	0.869	28 00	80.0	0.894		4.4	18.6	3.5	46.5
7 10	79.8	0.926	28 40	81.9	0.946		4.6	18.5	3.7	46.3
7 20	82.1	0.968	29 20	83.6	0.981		4.8	18.4	3.9	46.0
7 30	84.1	0.993	30 00	85.3	0.998		-5.0	18.3	-4.0	45.7
7 40	86.2	1.000	30 40	86.9	0.997		5.2	18.2	4.2	45.4
							5.4	18.0	4.4	45.2
							5.5	17.9	4.5	44.8
							5.7	17.8	4.7	44.5
							-5.8	17.7	-4.8	44.2

Position angle of satellite $p = p^1 + (P - P_0)$

Apparent distance of satellite $s = F \frac{\alpha(p)}{p}$

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF JUPITER.

Date.	Light Time.	Stellar Magnitude.	P	$A_{\oplus} + 180^{\circ}$	D_{\oplus}	$A_{\odot} + 180^{\circ}$	D_{\odot}
Jan. 1	^m 35 ^o 02	-2.2	^o 8.29	^o 330.38	^o +1.52	^o 329.12	^o +1.58
8	35.00	2.2	7.88	329.44	1.52	329.71	1.55
15	35.11	2.2	7.46	328.50	1.53	330.29	1.52
22	35.34	2.2	7.06	327.61	1.54	330.87	1.50
29	35.70	2.2	6.70	326.78	1.54	331.45	1.47
Feb. 5	36.17	-2.1	6.37	326.07	+1.54	332.03	+1.44
12	36.75	2.1	6.10	325.48	1.54	332.61	1.41
19	37.41	2.1	5.90	325.02	1.54	333.19	1.38
26	38.16	2.0	5.77	324.73	1.54	333.77	1.36
Mar. 5	38.97	2.0	5.71	324.60	1.53	334.35	1.33
12	39.83	-1.9	5.72	324.62	+1.52	334.92	+1.30
19	40.73	1.9	5.80	324.80	1.51	335.50	1.27
26	41.66	1.8	5.96	325.14	1.50	336.08	1.25
Apr. 2	42.59	1.8	6.18	325.63	1.48	336.65	1.22
9	43.53	1.8	6.46	326.25	1.46	337.23	1.19
16	44.46	-1.7	6.80	326.99	+1.44	337.80	+1.16
23	45.36	1.6	7.18	327.86	1.41	338.38	1.13
30	46.24	1.6	7.62	328.83	1.38	338.95	1.10
May 7	47.07	1.6	8.09	329.89	1.35	339.52	1.08
14	47.86	1.5	8.60	331.04	1.32	340.09	1.05
21	48.60	-1.5	9.13	332.27	+1.28	340.66	+1.02
28	49.29	1.5	9.69	333.56	1.24	341.24	0.99
June 4	49.91	1.4	10.27	334.92	1.20	341.81	0.96
11	50.46	1.4	10.86	336.32	1.16	342.38	0.93
18	50.94	1.4	11.46	337.77	1.11	342.95	0.90
25	51.35	-1.4	12.07	339.25	+1.06	343.52	+0.87

Aug. 28	51.35	-1.4	17.26	353.26	+0.53	348.69	+0.60
Sept. 4	50.94	1.4	17.74	354.71	0.47	349.25	0.57
11	50.46	-1.4	18.19	356.13	+0.41	349.82	+0.51
18	49.91	1.4	18.62	357.50	0.34	350.38	0.51
25	49.29	1.4	19.01	358.81	0.28	350.94	0.48
Oct. 2	48.60	1.5	19.38	0.06	0.22	351.50	0.45
9	47.86	1.5	19.72	1.23	0.16	352.06	0.42
16	47.07	-1.6	20.02	2.32	+0.10	352.62	+0.39
23	46.24	1.6	20.29	3.30	+0.04	353.18	0.36
30	45.37	1.6	20.52	4.19	-0.01	353.74	0.34
Nov. 6	44.48	1.7	20.72	4.96	0.06	354.30	0.30
13	43.57	1.7	20.89	5.60	0.11	354.86	0.28
20	42.66	-1.8	21.02	6.11	-0.15	355.42	+0.24
27	41.75	1.8	21.11	6.47	0.19	355.98	0.22
Dec. 4	40.87	1.8	21.16	6.68	0.23	356.53	0.19
11	40.02	1.9	21.18	6.73	0.26	357.09	0.16
18	39.23	1.9	21.16	6.62	0.28	357.65	0.13
25	38.49	-2.0	21.09	6.34	-0.30	358.20	+0.10
32	37.83	-2.0	20.99	5.92	-0.32	358.76	+0.07

JUPITER, 1931.

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EPHEMERIS FOR PHYSICAL OBSERVATIONS OF JUPITER.

Date.	Equatorial Diameter.	Excess of Equat. Diameter over Polar.	<i>i</i>	<i>q</i>	<i>Q</i>	Central Meridian.		Correc- tion for Phase.
						System I.	System II.	
Jan. 1	46°73	3°11	1°26	0°01	275°66	81°99	113°50	+0°01
8	46°75	3°11	0°27	0°00	103°21	108°24	86°35	0°00
15	46°61	3°10	1°79	0°01	97°21	134°42	59°11	-0°01
22	46°30	3°08	3°26	0°04	96°40	160°47	31°75	0°05
29	45°84	3°05	4°66	0°08	95°87	186°37	4°25	0°09
Feb. 5	45°24	3°01	5°96	0°12	95°46	212°10	336°57	-0°16
12	44°53	2°96	7°14	0°17	95°16	237°64	308°71	0°22
19	43°74	2°91	8°16	0°22	94°92	262°99	280°64	0°29
26	42°88	2°85	9°04	0°27	94°75	288°13	252°38	0°36
Mar. 5	41°99	2°80	9°75	0°31	94°65	313°07	223°91	0°41
12	41°08	2°74	10°30	0°33	94°62	337°82	195°26	-0°46
19	40°17	2°67	10°69	0°35	94°67	2°38	166°42	0°50
26	39°28	2°62	10°93	0°36	94°78	26°78	137°41	0°52
Apr. 2	38°42	2°56	11°03	0°36	94°96	51°03	108°25	0°53
9	37°59	2°50	10°98	0°35	95°18	75°14	78°96	0°53
16	36°81	2°45	10°81	0°33	95°46	99°13	49°54	-0°51
23	36°08	2°40	10°52	0°30	95°78	123°01	20°02	0°48
30	35°39	2°36	10°12	0°28	96°16	146°81	350°41	0°45
May 7	34°76	2°31	9°63	0°25	96°55	170°53	320°73	0°40
14	34°19	2°28	9°05	0°21	96°98	194°20	290°99	0°36
21	33°67	2°24	8°40	0°18	97°42	217°82	261°20	-0°31
28	33°20	2°21	7°68	0°15	97°87	241°41	231°39	0°26
June 4	32°79	2°18	6°89	0°12	98°33	264°98	201°55	0°21
11	32°43	2°16	6°06	0°09	98°77	288°54	171°71	0°16
18	32°13	2°14	5°18	0°06	99°20	312°10	141°86	0°12
25	31°87	2°12	4°27	0°04	99°58	335°67	112°02	-0°08
.....
Aug. 28	31°87	2°12	4°57	0°05	286°39	347°26	355°29	+0°09
Sept. 4	32°12	2°14	5°46	0°07	286°64	11°35	325°97	0°13
11	32°43	2°16	6°32	0°10	286°95	35°53	296°73	+0°17
18	32°79	2°18	7°12	0°12	287°24	59°79	267°59	0°22
25	33°20	2°21	7°87	0°16	287°52	84°16	238°54	0°27
Oct. 2	33°67	2°24	8°56	0°19	287°80	108°63	209°60	0°32
9	34°19	2°28	9°17	0°22	288°04	133°21	180°76	0°37
16	34°77	2°32	9°70	0°25	288°27	157°91	152°05	+0°41
23	35°39	2°36	10°12	0°28	288°46	182°73	123°45	0°45
30	36°07	2°40	10°45	0°30	288°62	207°67	94°98	0°48
Nov. 6	36°79	2°45	10°66	0°32	288°75	232°75	66°64	0°49
13	37°56	2°50	10°75	0°33	288°83	257°96	38°44	0°50
20	38°36	2°56	10°70	0°33	288°87	283°31	10°37	+0°50
27	39°19	2°61	10°50	0°33	288°88	308°80	342°45	0°48
Dec. 4	40°04	2°67	10°15	0°31	288°82	334°43	314°66	0°45
11	40°89	2°72	9°64	0°29	288°71	0°20	287°02	0°40
18	41°72	2°78	8°98	0°26	288°54	26°09	259°50	0°35
25	42°51	2°83	8°15	0°22	288°29	52°11	232°10	+0°29
32	43°25	2°88	7°18	0°17	287°96	78°23	204°81	+0°22

JUPITER, 1931.

LONGITUDE OF THE CENTRAL MERIDIAN OF THE ILLUMINATED DISC.
SYSTEM I.

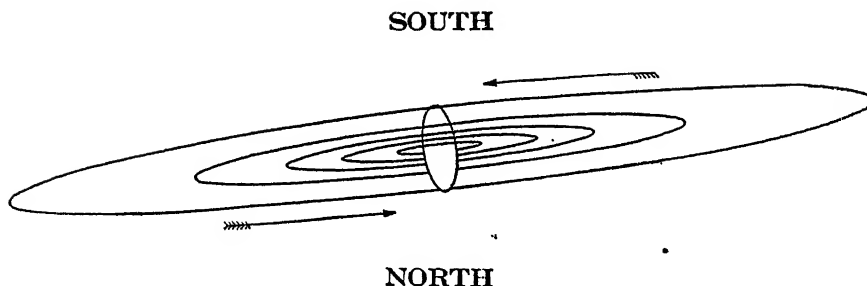
Jan.	1	82°0	Feb.	21	218°5	Apr.	13	345°5	June	3	107°1	Sept.	22	331°1	Nov.	12	100°6
	2	240°0		22	16°3		14	143°2		4	264°8		23	128°9		13	258°5
	3	38°1		23	174°2		15	300°9		5	62°4		24	286°6		14	56°4
	4	196°1		24	332°1		16	98°6		6	220°1		25	84°4		15	214°3
	5	354°1		25	129°9		17	256°3		7	17°7		26	242°2		16	12°2
	6	152°2		26	287°8		18	54°0		8	175°4		27	40°0		17	170°1
	7	310°2		27	85°6		19	211°7		9	333°1		28	197°8		18	328°0
	8	108°2		28	243°5		20	9°4		10	130°7		29	355°6		19	125°9
	9	266°3	Mar.	1	41°3		21	167°1		11	288°4		30	153°4		20	283°8
	10	64°3		2	199°2		22	324°8		12	86°0	Oct.	1	311°2		21	81°7
	11	222°3		3	357°0		23	122°5		13	243°7		2	109°0		22	239°6
	12	20°4		4	154°8		24	280°2		14	41°4		3	266°8		23	37°6
	13	178°4		5	312°7		25	77°9		15	199°0		4	64°5		24	195°5
	14	336°4		6	110°5		26	235°6		16	356°7		5	222°4		25	353°4
	15	134°4		7	268°3		27	33°3		17	154°3		6	20°2		26	151°3
	16	292°4		8	66°1		28	191°0		18	312°0		7	178°0		27	309°3
	17	90°4		9	223°9		29	348°7		19	109°6		8	335°8		28	107°2
	18	248°4		10	21°8		30	146°4		20	267°3		9	133°6		29	265°1
	19	46°4		11	179°6	May	1	304°0		21	65°0		10	291°4		30	63°1
	20	204°4		12	337°4		2	101°7		22	222°6		11	89°2	Dec.	1	221°0
	21	2°4		13	135°2		3	259°4		23	20°3		12	247°0		2	19°0
	22	160°4		14	293°0		4	57°1		24	177°9		13	44°8		3	176°9
	23	318°4		15	90°7		5	214°8		25	335°6		14	202°7		4	334°9
	24	116°4		16	248°5		6	12°5		..	....		15	0°5		5	132°8
	25	274°4		17	46°3		7	170°1		..	....		16	158°3		6	290°8
	26	72°4		18	204°1		8	327°8		..	....		17	316°2		7	88°7
	27	230°3		19	1°9		9	125°5	Aug.	28	347°3		18	114°0		8	246°7
	28	28°3		20	159°7		10	283°2		29	145°1		19	271°8		9	44°7
	29	186°3		21	317°4		11	80°8		30	302°8		20	69°6		10	202°6
	30	344°2		22	115°2		12	238°5		31	100°5		21	227°5		11	0°6
	31	142°2		23	273°0		13	36°2	Sept.	1	258°3		22	25°3		12	158°6
Feb.	1	300°2		24	70°7		14	193°8		2	56°0		23	183°2		13	316°5
	2	98°1		25	228°5		15	351°5		3	213°7		24	341°0		14	114°5
	3	256°0		26	26°3		16	149°2		4	11°5		25	138°9		15	272°5
	4	54°0		27	184°0		17	306°8		5	169°2		26	296°7		16	70°5
	5	211°9		28	341°8		18	104°5		6	327°0		27	94°6		17	228°5
	6	9°9		29	139°5		19	262°2		7	124°7		28	252°4		18	26°4
	7	167°8		30	297°3		20	59°8		8	282°4		29	50°3		19	184°4
	8	325°8		31	95°0		21	217°5		9	80°2		30	208°2		20	342°4
	9	123°7	Apr.	1	252°8		22	15°2		10	238°0		31	6°0		21	140°4
	10	281°6		2	50°5		23	172°8		11	35°7	Nov.	1	163°9		22	298°4
	11	79°5		3	208°2		24	330°5		12	193°5		2	321°7		23	96°4
	12	237°4		4	6°0		25	128°2		13	351°2		3	119°6		24	254°4
	13	35°3		5	163°7		26	285°8		14	149°0		4	277°5		25	52°4
	14	193°2		6	321°4		27	83°5		15	306°7		5	75°4		26	210°4
	15	351°1		7	119°2		28	241°2		16	104°5		6	233°2		27	8°4
	16	149°0		8	276°9		29	38°8		17	262°2		7	31°1		28	166°4
	17	306°9		9	74°6		30	196°5		18	60°0		8	189°0		29	324°4
	18	104°8		10	232°3		31	354°1		19	217°8		9	346°9		30	122°4
	19	262°7		11	30°1	June	1	151°8		20	15°5		10	144°8		31	280°4
	20	60°6		12	187°8		2	309°5		21	173°3		11	302°7		32	78°5

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LONGITUDE OF THE CENTRAL MERIDIAN OF THE ILLUMINATED DISC.
SYSTEM II.

Jan. 1	113.5	Feb. 21	220.8	Apr. 13	318.8	June 3	51.3	Sept. 22	148.4	Nov. 12	248.6
2	263.9	22	11.1	14	108.9	4	201.3	23	298.5	13	38.9
3	54.3	23	161.3	15	259.0	5	351.4	24	88.7	14	189.2
4	204.7	24	311.6	16	49.0	6	141.4	25	238.8	15	339.5
5	355.2	25	101.8	17	199.1	7	291.4	26	29.0	16	129.8
6	145.6	26	252.0	18	349.2	8	81.5	27	179.1	17	280.0
7	296.0	27	42.2	19	139.3	9	231.5	28	329.3	18	70.3
8	86.4	28	192.5	20	289.3	10	21.5	29	119.4	19	220.6
9	236.8	Mar. 1	342.7	21	79.4	11	171.6	30	269.6	20	10.9
10	27.2	2	132.9	22	229.5	12	321.6	Oct. 1	59.8	21	161.2
11	177.6	3	283.1	23	19.5	13	111.6	2	209.9	22	311.4
12	327.9	4	73.3	24	169.6	14	261.6	3	0.1	23	101.7
13	118.3	5	223.5	25	319.7	15	51.7	4	150.3	24	252.0
14	268.7	6	13.7	26	109.7	16	201.7	5	300.4	25	42.3
15	59.1	7	163.9	27	259.8	17	351.7	6	90.6	26	192.6
16	209.5	8	314.1	28	49.8	18	141.7	7	240.8	27	342.9
17	359.9	9	104.3	29	199.9	19	291.8	8	31.0	28	133.2
18	150.2	10	254.4	30	350.0	20	81.8	9	181.1	29	283.5
19	300.6	11	44.6	May 1	140.0	21	231.8	10	331.3	30	73.8
20	91.0	12	194.8	2	290.1	22	21.9	11	121.5	Dec. 1	224.2
21	241.4	13	345.0	3	80.1	23	171.9	12	271.7	2	14.5
22	31.7	14	135.1	4	230.2	24	321.9	13	61.9	3	164.8
23	182.1	15	285.3	5	20.2	25	111.9	14	212.1	4	315.1
24	332.4	16	75.5	6	170.3	..	....	15	2.3	5	105.4
25	122.8	17	225.6	7	320.3	..	....	16	152.5	6	255.8
26	273.1	18	15.8	8	110.4	..	....	17	302.7	7	46.1
27	63.5	19	165.9	9	260.4	Aug. 28	355.4	18	92.9	8	196.4
28	213.8	20	316.1	10	50.5	29	145.5	19	243.1	9	346.8
29	4.2	21	106.2	11	200.5	30	295.6	20	33.3	10	137.1
30	154.5	22	256.4	12	350.6	31	85.7	21	183.5	11	287.4
31	304.8	23	46.5	13	140.6	Sept. 1	235.8	22	333.7	12	77.8
Feb. 1	95.2	24	196.6	14	290.6	2	25.9	23	123.9	13	228.1
2	245.5	25	346.8	15	80.7	3	176.0	24	274.1	14	18.4
3	35.8	26	136.9	16	230.7	4	326.1	25	64.3	15	168.8
4	186.1	27	287.0	17	20.8	5	116.2	26	214.6	16	319.1
5	336.4	28	77.1	18	170.8	6	266.3	27	4.8	17	109.5
6	126.7	29	227.3	19	320.8	7	56.4	28	155.0	18	259.8
7	277.0	30	17.4	20	110.9	8	206.6	29	305.2	19	50.2
8	67.3	31	167.5	21	260.9	9	356.7	30	95.5	20	200.6
9	217.6	Apr. 1	317.6	22	50.9	10	146.8	31	245.7	21	350.9
10	7.9	2	107.7	23	201.0	11	296.9	Nov. 1	35.9	22	141.3
11	158.2	3	257.8	24	351.0	12	87.0	2	186.2	23	201.7
12	308.5	4	47.9	25	141.0	13	237.2	3	336.4	24	82.0
13	98.8	5	198.0	26	291.1	14	27.3	4	126.7	25	232.4
14	249.0	6	348.1	27	81.1	15	177.4	5	276.9	26	22.8
15	39.3	7	138.2	28	231.1	16	327.6	6	67.1	27	173.1
16	189.6	8	288.3	29	21.2	17	117.7	7	217.4	28	323.5
17	339.8	9	78.4	30	171.2	18	267.8	8	7.6	29	113.9
18	130.1	10	228.5	31	321.2	19	58.0	9	157.9	30	264.3
19	280.4	11	18.6	June 1	111.2	20	208.1	10	308.0	31	54.6
20	70.6	12	168.7	2	261.3	21	358.2	11	98.3	32	205.0



APPARENT ORBITS OF THE SATELLITES OF JUPITER AT DATE OF OPPOSITION, 1931 JANUARY 6, AS SEEN IN AN INVERTING TELESCOPE.

The orbits are elongated in the ratio of three to one in the direction of their minor axes.

MEAN SYNODIC PERIODS OF THE SATELLITES.

I	^d 1	^h 18	^m 28	^s 35.946	=	^d 1.7698	6049		V	^h 11	^m 57	^s 27.635	=	^d 0.4982	3652
II	3	13	17	53.736	=	3.5540	9417		VI				=	266.00	
III	7	03	59	35.856	=	7.1663	8722		VII				=	276.67	
IV	16	18	05	06.916	=	16.7535	5227								

SATELLITE V.

GREENWICH MEAN TIME OF EVERY TWENTIETH GREATEST ELONGATION.

Jan.	d	h		E.	Apr.	d	h		E.	Jan.	d	h		W.	Apr.	d	h		W.
	1	20.3		E.		1	12.4		E.		2	02.3		W.		1	18.4		W.
	11	19.4		E.		11	11.6		E.		12	01.4		W.		11	17.6		W.
	21	18.5		E.		..	..				22	00.5		W.		..	..
	31	17.6		E.	Nov.	12	18.0		E.		31	23.6		W.	Nov.	13	00.0		W.
Feb.	10	16.7		E.		22	17.2		E.	Feb.	10	22.7		W.		22	23.2		W.
	20	15.8		E.	Dec.	2	16.3		E.		20	21.8		W.	Dec.	2	22.3		W.
Mar.	2	15.0		E.		12	15.4		E.	Mar.	2	20.9		W.		12	21.4		W.
	12	14.1		E.		22	14.5		E.		12	20.1		W.		22	20.5		W.
	22	13.3		E.		32	13.6		E.		22	19.2		W.		32	19.5		W.

MULTIPLES OF THE MEAN SYNODIC PERIOD OF SATELLITE V.

I	..	d	h		6	..	d	h		11	..	d	h		16	..	d	h	
		0	12.0				2	23.7				5	11.5				7	23.3	
2	..	0	23.9		7	..	3	11.7		12	..	5	23.5		17	..	8	11.3	
3	..	1	11.9		8	..	3	23.7		13	..	6	11.4		18	..	8	23.2	
4	..	1	23.8		9	..	4	11.6		14	..	6	23.4		19	..	9	11.2	
5	..	2	11.8		10	..	4	23.6		15	..	7	11.4		20	..	9	23.2	

SATELLITES OF JUPITER, 1931.

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MEAN TIME OF SUPERIOR GEOCENTRIC CONJUNCTION.

SATELLITE I. (Io).

Jan.	d	h	m	Mar.	d	h	m	June	d	h	m	Oct.	d	h	m
	0	19	47.1		24	22	54.3		16	04	08.0		11	01	10.1
	2	14	13.0		26	17	22.8		17	22	38.3		12	19	39.3
	4	08	38.9		28	11	51.5		19	17	08.6		14	14	08.5
	6	03	04.9		30	06	20.2		21	11	38.9		16	08	37.7
	7	21	30.7	Apr.	1	00	49.1		23	06	09.2		18	03	06.8
	9	15	56.7		2	19	17.9		25	00	39.5		19	21	35.8
	11	10	22.6		4	13	46.9		26	19	09.7		21	16	04.8
	13	04	48.7		6	08	15.8						23	10	33.8
	14	23	14.6		8	02	44.9						25	05	02.7
	16	17	40.7		9	21	13.9						26	23	31.7
	18	12	06.7		11	15	43.1						28	18	00.4
	20	06	32.8		13	10	12.3						30	12	29.2
	22	00	58.9		15	04	41.5					Nov.	1	06	57.9
	23	19	25.1		16	23	10.8						3	01	26.5
	25	13	51.3		18	17	40.1	Aug.	13	14	47.4		4	19	55.1
	27	08	17.6		20	12	09.6		15	09	17.5		6	14	23.7
	29	02	43.9		22	06	39.0		17	03	47.7		8	08	52.2
	30	21	10.3		24	01	08.5		18	22	17.8		10	03	20.6
Feb.	1	15	36.7		25	19	38.1		20	16	47.9		11	21	49.0
	3	10	03.2		27	14	07.6		22	11	18.0		13	16	17.2
	5	04	29.7		29	08	37.3		24	05	48.1		15	10	45.5
	6	22	56.4	May	1	03	06.9		26	00	18.1		17	05	13.7
	8	17	23.0		2	21	36.7		27	18	48.1		18	23	41.9
	10	11	49.8		4	16	06.3		29	13	18.1		20	18	09.9
	12	06	16.6		6	10	36.2		31	07	48.1		22	12	37.9
	14	00	43.5		8	05	05.9	Sept.	2	02	18.1		24	07	05.8
	15	19	10.4		9	23	35.9		3	20	48.0		26	01	33.7
	17	13	37.5		11	18	05.7		5	15	17.9		27	20	01.5
	19	08	04.6		13	12	35.6		7	09	47.8		29	14	29.3
	21	02	31.8		15	07	05.5		9	04	17.7	Dec.	1	08	56.9
	22	20	59.0		17	01	35.5		10	22	47.6		3	03	24.6
	24	15	26.4		18	20	05.4		12	17	17.4		4	21	52.1
	26	09	53.8		20	14	35.5		14	11	47.2		6	16	19.6
	28	04	21.4		22	09	05.5		16	06	16.9		8	10	47.0
Mar.	1	22	48.9		24	03	35.6		18	00	46.6		10	05	14.3
	3	17	16.6		25	22	05.6		19	19	16.3		11	23	41.6
	5	11	44.3		27	16	35.8		21	13	46.0		13	18	08.8
	7	06	12.1		29	11	05.9		23	08	15.6		15	12	35.9
	9	00	39.9		31	05	36.1		25	02	45.2		17	07	03.0
	10	19	07.9	June	2	00	06.2		26	21	14.8		19	01	30.0
	12	13	35.9		3	18	36.4		28	15	44.3		20	19	56.9
	14	08	04.1		5	13	06.5		30	10	13.9		22	14	23.8
	16	02	32.2		7	07	36.8	Oct.	2	04	43.3		24	08	50.6
	17	21	00.5		9	02	07.0		3	23	12.8		26	03	17.3
	19	15	28.8		10	20	37.3		5	17	42.2		27	21	44.0
	21	09	57.3		12	15	07.5		7	12	11.5		29	16	10.6
	23	04	25.7		14	09	37.8		9	06	40.8		31	10	37.2

SATELLITES OF JUPITER, 1931.

MEAN TIME OF SUPERIOR GEOCENTRIC CONJUNCTION.

SATELLITE II. (EUROPA).

	d	h	m		d	h	m		d	h	m		d	h	m
Jan.	3	07	19.9	Mar.	29	11	34.8	June	22	20	14.6	Oct.	11	04	00.2
	6	20	26.3	Apr.	2	00	52.1		26	09	39.3		14	17	22.5
	10	09	32.8		5	14	09.8						18	06	43.5
	13	22	39.3		9	03	28.1						21	20	04.9
	17	11	46.0		12	16	46.8						25	09	25.2
	21	00	52.9		16	06	06.0						28	22	45.8
	24	14	00.1		19	19	25.5					Nov.	1	12	05.1
	28	03	07.6		23	08	45.6						5	01	24.7
	31	16	15.6		26	22	06.0	Aug.	15	05	34.6		8	14	43.1
Feb.	4	05	23.9		30	11	26.9		18	19	00.4		12	04	01.7
	7	18	32.7	May	4	00	47.9		22	08	25.2		15	17	19.1
	11	07	42.0		7	14	09.6		25	21	50.8		19	06	36.5
	14	20	51.8		11	03	31.5		29	11	15.4		22	19	52.8
	18	10	02.2		14	16	53.7	Sept.	2	00	40.7		26	09	09.1
	21	23	13.2		18	06	16.2		5	14	05.1		29	22	24.3
	25	12	24.6		21	19	39.0		9	03	30.1	Dec.	3	11	39.3
Mar.	1	01	36.8		25	09	02.1		12	16	54.0		7	00	53.3
	4	14	49.5		28	22	25.3		16	06	18.7		10	14	07.1
	8	04	02.8	June	1	11	49.0		19	19	42.2		14	03	19.9
	11	17	16.7		5	01	12.6		23	09	06.4		17	16	32.5
	15	06	31.2		8	14	36.7		26	22	29.4		21	05	44.1
	18	19	46.3		12	04	00.8		30	11	53.0		24	18	55.5
	22	09	01.9		15	17	25.4	Oct.	4	01	15.4		28	08	05.9
	25	22	18.1		19	06	49.7		7	14	38.4		31	21	16.2

SATELLITE III. (GANYMEDE).

	d	h	m		d	h	m		d	h	m		d	h	m
Jan.	2	22	29.6	Mar.	29	16	54.9	June	23	20	05.1	Oct.	9	14	16.5
	10	01	44.6	Apr.	5	20	54.6						16	18	29.2
	17	05	01.0		13	00	58.1						23	22	38.9
	24	08	18.7		20	05	05.6						31	02	45.8
	31	11	39.3		27	09	17.1	Aug.	13	03	19.3	Nov.	7	06	49.3
Feb.	7	15	02.6	May	4	13	31.1		20	07	46.4		14	10	49.6
	14	18	29.7		11	17	47.9		27	12	11.8		21	14	45.2
	21	22	01.5		18	22	06.4	Sept.	3	16	36.0		28	18	36.3
Mar.	1	01	38.3		26	02	26.2		10	20	59.4	Dec.	5	22	22.3
	8	05	20.7	June	2	06	48.8		18	01	21.4		13	02	03.5
	15	09	07.5		9	11	12.8		25	05	42.4		20	05	40.5
	22	12	59.3		16	15	38.7	Oct.	2	10	00.6		27	09	12.8

SATELLITE IV. (CALLISTO).

	d	h	m		d	h	m		d	h	m		d	h	m
Jan.	4	09	01.6	Mar.	28	14	36.3	June	20	16	08.5	Oct.	16	15	00.9
	20	23	05.2	Apr.	14	08	52.9					Nov.	2	09	58.4
Feb.	6	13	35.6	May	1	03	55.2	Aug.	27	02	56.3		19	04	07.7
	23	04	55.7		17	23	34.3	Sept.	12	23	21.7	Dec.	5	21	21.9
Mar.	11	21	15.5	June	3	19	41.9		29	19	25.7		22	13	35.2

DIFFERENTIAL CO-ORDINATES OF SATELLITE VI.

Date.	$\alpha_{vi}-\alpha_j$	$\delta_{vi}-\delta_j$	Date.	$\alpha_{vi}-\alpha_j$	$\delta_{vi}-\delta_j$	Date.	$\alpha_{vi}-\alpha_j$	$\delta_{vi}-\delta_j$
Jan. 1	+ 2 ^m 59 ^s	+ 23.7	Apr. 11	- 2 43	- 22.9	Sept. 27	+ 1 57	+ 8.9
5	2 34	23.9	15	2 31	23.2	Oct. 1	1 43	8.2
9	2 07	23.7	19	2 19	23.2	5	1 28	7.4
13	1 37	23.1	23	2 06	23.1	9	1 10	6.4
17	1 05	22.0	27	1 53	22.8	13	0 51	5.3
21	+ 0 33	+ 20.4	May 1	- 1 40	- 22.4	17	+ 0 31	+ 4.2
25	+ 0 01	18.4	5	1 27	21.8	21	+ 0 11	3.0
29	- 0 31	16.2	9	1 13	21.1	25	- 0 10	1.7
Feb. 2	1 02	13.7	13	1 00	20.2	29	0 31	+ 0.4
6	1 33	10.8	17	0 47	19.2	Nov. 2	0 53	- 0.9
10	- 2 00	+ 7.7	21	- 0 33	- 18.2	6	- 1 14	- 2.2
14	2 23	4.5	25	0 20	17.2	10	1 35	3.4
18	2 43	+ 1.4	29	- 0 07	16.1	14	1 56	4.6
22	3 00	- 1.7	June 2	+ 0 05	14.9	18	2 15	5.7
26	3 13	4.7	6	0 17	13.7	22	2 33	6.8
Mar. 2	- 3 23	- 7.6	10	+ 0 29	- 12.4	26	- 2 50	- 7.8
6	3 30	10.2	14	0 41	11.1	30	3 06	8.6
10	3 34	12.6	18	+ 0 52	- 9.8	Dec. 4	3 20	9.4
14	3 34	14.8	Sept. 3	+ 2 44	+ 9.9	8	3 32	10.1
18	3 32	16.7	7	+ 2 40	+ 10.1	12	3 42	10.7
22	- 3 28	- 18.3	11	2 35	10.2	16	- 3 50	- 11.3
26	3 22	19.7	15	2 28	10.1	20	3 56	11.8
30	3 15	20.8	19	2 19	9.8	24	4 00	12.2
Apr. 3	3 06	21.7	23	+ 2 09	+ 9.4	28	4 02	12.6
7	- 2 55	- 22.4				32	- 4 01	- 12.9

DIFFERENTIAL CO-ORDINATES OF SATELLITE VII.

Date.	$\alpha_{vii}-\alpha_j$	$\delta_{vii}-\delta_j$	Date.	$\alpha_{vii}-\alpha_j$	$\delta_{vii}-\delta_j$	Date.	$\alpha_{vii}-\alpha_j$	$\delta_{vii}-\delta_j$
Jan. 1	+ 3 ^m 56 ^s	- 7.2	Apr. 11	- 2 43	+ 28.5	Sept. 27	+ 2 ^m 48 ^s	- 6.2
5	3 58	3.7	15	2 53	27.5	Oct. 1	2 56	4.4
9	3 56	- 0.1	19	3 01	26.5	5	3 02	2.7
13	3 50	+ 3.5	23	3 08	25.3	9	3 07	- 0.9
17	3 41	7.0	27	3 14	24.0	13	3 10	+ 0.9
21	+ 3 28	+ 10.3	May 1	- 3 19	+ 22.7	17	+ 3 12	+ 2.6
25	3 12	13.4	5	3 23	21.4	21	3 13	4.4
29	2 55	16.2	9	3 26	20.1	25	3 13	6.1
Feb. 2	2 36	18.8	13	3 29	18.8	29	3 11	7.8
6	2 15	21.2	17	3 31	17.4	Nov. 2	3 08	9.5
10	+ 1 53	+ 23.3	21	- 3 32	+ 16.0	6	+ 3 04	+ 11.2
14	1 31	25.2	25	3 32	14.6	10	2 58	12.8
18	1 08	26.8	29	3 31	13.1	14	2 51	14.5
22	0 45	28.2	June 2	3 30	11.6	18	2 43	16.2
26	0 23	29.4	6	3 28	10.0	22	2 34	17.9
Mar. 2	+ 0 01	+ 30.3	10	- 3 25	+ 8.4	26	+ 2 23	+ 19.6
6	- 0 20	31.1	14	3 21	6.8	30	2 11	21.3
10	0 40	31.6	18	- 3 16	+ 5.1	Dec. 4	1 58	22.8
14	0 59	31.9	Sept. 3	+ 1 29	- 14.3	8	1 44	24.2
18	1 17	32.0	7	+ 1 46	- 13.4	12	1 28	25.5
22	- 1 34	+ 31.9	11	2 02	12.3	16	+ 1 11	+ 26.7
26	1 51	31.5	15	2 16	11.0	20	0 53	27.8
30	2 06	30.9	19	2 28	9.5	24	0 34	28.8
Apr. 3	2 20	30.2	23	+ 2 39	- 7.9	28	+ 0 14	29.0
7	- 2 32	+ 29.4				32	- 0 07	+ 30.3

JANUARY.

Day		h	m	Day		h	m	Day		h	m	Day		h	m
0	I E. c.	18	29.7	8	I Tr. c.	17	40	16	I Im.	16	32	24	II Im.	12	37
	I Em.	20	55		I Sh. c.	17	43		I E. f.	19	04.4		I Tr. c.	15	33
1	II Sh. c.	10	49		I Tr. f.	19	55	17	III Im.	03	21		I Sh. c.	16	00
	II Tr. c.	11	05		I Sh. f.	19	58		III E. f.	07	46.7		II E. f.	16	16.5
	II Sh. f.	13	37	9	I Im.	14	49		II Im.	10	23		I Tr. f.	17	48
	II Tr. f.	13	53		I E. f.	17	09.5		II E. f.	13	41.8		I Sh. f.	18	15
	I Sh. c.	15	49					25	I Tr. c.	13	49				
	I Tr. c.	15	56	10	III Im.	00	04		I Sh. c.	14	06	25	I Im.	12	43
	I Sh. f.	18	04		III E. f.	03	45.8		I Tr. f.	16	04		I E. f.	15	28.1
	I Tr. f.	18	12		II Im.	08	10		I Sh. f.	16	21	26			
2	I E. c.	12	58.4		II E. f.	11	07.1	18	I Im.	10	58		II Tr. c.	07	00
	I Em.	15	21		I Tr. c.	12	06		I E. f.	13	33.0		II Sh. c.	07	59
	III E. c.	20	25.7		I Sh. c.	12	11						II Tr. c.	09	48
3	III Em.	00	10		I Tr. f.	14	21	19	II Tr. c.	04	43		I Tr. c.	09	59
	II E. c.	05	40.3	11	I Sh. f.	14	27		II Sh. c.	05	22		I Sh. c.	10	29
	II Em.	08	43		I Im.	09	14		II Tr. f.	07	31		II Sh. f.	10	48
	I Sh. c.	10	17		I E. f.	11	38.1		II Sh. f.	08	10		I Tr. f.	12	14
	I Tr. c.	10	22	12	II Tr. c.	02	28		I Tr. c.	08	15	27	I Im.	07	09
	I Sh. f.	12	33		II Sh. c.	02	44		I Sh. c.	08	34		I E. f.	09	56.9
	I Tr. f.	12	37		II Tr. f.	05	16		I Tr. f.	10	30		III Tr. c.	20	28
4	IV E. c.	07	00.7		II Sh. f.	05	33	20	I Im.	05	25		III Sh. c.	22	35
	I E. c.	07	27.0		I Tr. c.	06	31		I E. f.	08	01.8	28	II Im.	01	45
	I Em.	09	47		I Sh. c.	06	40		III Tr. c.	17	10		III Sh. f.	01	57
	IV Em.	10	30		I Tr. f.	08	47		III Sh. c.	18	36		I Tr. c.	04	26
5	II Sh. c.	00	07		I Sh. f.	08	55		III Tr. f.	20	29		I Sh. c.	04	57
	II Tr. c.	00	13		IV Tr. c.	15	10		IV Im.	21	37		II E. f.	05	33.9
	II Sh. f.	02	56		IV Tr. f.	16	35		III Sh. f.	21	57		I Tr. f.	06	41
	II Tr. f.	03	01		IV Sh. f.	19	32		II Im.	23	30		I Sh. f.	07	12
	I Sh. c.	04	46	13	I Im.	03	40	21	IV Em.	00	34	29	I Im.	01	36
	I Tr. c.	04	48		I E. f.	06	06.9		IV E. c.	01	01.6		I E. f.	04	25.7
	I Sh. f.	07	01		III Tr. c.	13	54		I Tr. c.	02	41		IV Tr. c.	05	28
	I Tr. f.	07	03		III Sh. c.	14	36		II E. f.	02	59.2		IV Tr. f.	08	23
6	I E. c.	01	55.7		III Tr. f.	17	13		I Sh. c.	03	03		IV Sh. c.	10	34
	I Em.	04	13		III Sh. f.	17	57		IV E. f.	04	04.2		IV Sh. f.	13	41
	III Sh. c.	10	37		II Im.	21	16	22	I Tr. f.	04	56		II Tr. c.	20	08
	III Tr. c.	10	39	14	II E. f.	00	24.4		I Sh. f.	05	18		II Sh. c.	21	17
	III Sh. f.	13	57		I Tr. c.	00	57		I Im.	23	51		I Tr. c.	22	52
	III Tr. f.	13	59		I Sh. c.	01	08		I E. f.	02	30.5	30	II Sh. f.	00	07
	II Im.	19	03		I Tr. f.	03	13		II Tr. c.	17	51		I Tr. f.	01	07
	II E. f.	21	49.7		I Sh. f.	03	24		II Sh. c.	18	40		I Sh. f.	01	41
	I Sh. c.	23	14		I Im.	22	06		I Tr. c.	21	07		I Im.	20	02
	I Tr. c.	23	14	15	I E. f.	00	35.6		II Sh. f.	21	29		I E. f.	22	54.5
7	I Tr. f.	01	29		II Tr. c.	15	35		I Sh. c.	21	31	31	III Im.	09	59
	I Sh. f.	01	30		II Sh. c.	16	03		I Tr. f.	23	22		II Im.	14	53
	I Im.	20	23		II Tr. f.	18	23	23	I Im.	18	17		III E. f.	15	48.3
	I E. f.	22	40.7		II Sh. f.	18	51		I E. f.	20	59.4		I Tr. c.	17	18
8	II Tr. c.	13	20		I Tr. c.	19	23						I Sh. c.	17	54
	II Sh. c.	13	25		I Sh. c.	19	37	24	III Im.	06	39		II E. f.	18	51.4
	II Tr. f.	16	08		I Tr. f.	21	38		III E. f.	11	47.3		I Tr. f.	19	33
	II Sh. f.	16	14		I Sh. f.	21	52						I Sh. f.	20	10

I.
Jan. 2, $x_1 = -1.1$; $y_1 = +0.1$
Jan. 16, $x_2 = +1.2$; $y_2 = +0.2$

II.
Jan. 6, $x_2 = +1.0$; $y_2 = +0.2$
Jan. 17, $x_2 = +1.4$; $y_2 = +0.2$

III.
Jan. 17, $x_2 = +1.5$; $y_2 = +0.4$

IV.
Jan. 4, $x_1 = -0.8$; $y_1 = +0.7$

Eclipse commences - - E. c.
Eclipse finishes - - E. f.
Occultation, immersion - Im.
Occultation, emersion - Em.

Transit commences - - Tr. c.
Transit finishes - - Tr. f.
Shadow commences - - Sh. c.
Shadow finishes - - Sh. f.

SATELLITES OF JUPITER, 1931.

597

JANUARY.

Configurations at 23^h 45^m.

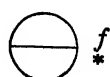
Day.	West.	East.
0	'4 3° ○ '1 2°	
1	'4 '3 2° '1° ○	
2	'4 '2 ○ '1 '3	● '3
3	'1 '4 ○ '2 '3	
4	2 ○ '1 '4 3°	
5	'2 '1 ○ 3° '4	
6	3° ○ '2 '4 1 ○	
7	3° ○ '1 2° '4	
8	'3 2 '1° ○ 4°	
9	'2 . ○ ₃ '1 4°	
10	'1° ○ '2 '3 4°	
11	○ 2; '1 '4° '3	
12	'2° 4° '1 ○ 3°	
13	4° 3° '1 ○	● '2
14	4° 3° ○ 2°	● '1
15	4° '3 2° '1° ○	
16	'4 '2 '3 ○ '1	
17	'4 '1° ○ '2 '3	
18	'4 ○ 2 '1° '3	
19	2° '4 '1 ○ 3°	
20	● '2 3° ○ '1°	● '4
21	3° . ○ '2°	
22	'3 2 '1° ○ '4	
23	'2 '3 ○ '1 '4	
24	'1° ○ '2 '3 '4	
25	○ 2° '1° '3 4°	
26	2° '1° ○ 3° 4°	
27	3° ○ '2 ○ '1° 4°	
28	3° '1 ○ 4° '2	
29	'3 '4° 2° ○	1 ○
30	4° '2 '3 ○ '1	
31	4° '1° ○ '2 '3	

PHASES OF THE ECLIPSES.

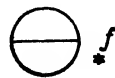
I



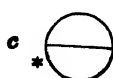
II



III



IV



FEBRUARY.

Day		h	m	Day		h	m	Day		h	m	Day		h	m
1	I Im. I E. f.	14 28 17 23.3		8	I Im. I E. f.	16 15 19 18.5		15	II E. f. IV Sh. c. IV Sh. f. I Im. I E. f.	00 01.3 04 34 07 50 18 02 21 14.0		22	III E. c. I Tr. f. I Sh. f. II E. f. III E. f. I Im. I E. f.	00 24.0 00 54 01 53 02 36.4 03 49.3 19 51 23 09.4	
2	II Tr. c. II Sh. c. I Tr. c. II Tr. f. I Sh. c. II Sh. f. I Tr. f. I Sh. f.	09 18 10 37 11 45 12 06 12 23 13 26 14 00 14 38		9	II Tr. c. II Sh. c. I Tr. c. I Sh. c. II Tr. f. I Tr. f. II Sh. f. I Sh. f.	11 38 13 14 13 31 14 18 14 26 15 45 16 04 16 33		16	II Tr. c. I Tr. c. II Sh. c. I Sh. c. II Tr. f. I Tr. f. I Sh. f. II Sh. f.	14 00 15 18 15 52 16 12 16 48 17 32 18 27 18 42		23	IV Im. IV Em. IV E. c. II Tr. c. IV E. f. I Tr. c. I Sh. c. II Sh. c. II Tr. f. I Tr. f. I Sh. f. II Sh. f.	03 20 06 25 13 06.6 16 25 16 29.3 17 06 18 07 18 30 19 12 19 21 20 22 21 20	
3	I Im. I E. f. III Tr. c.	08 55 11 52.1 23 50		10	I Im. I E. f.	10 42 13 47.4		17	I Im. I E. f.	12 29 15 42.9		24	I Im. I E. f.	14 18 17 38.3	
4	III Sh. c. III Tr. f. II Im. III Sh. f. I Tr. c. I Sh. c. II E. f. I Tr. f. I Sh. f.	02 34 03 09 04 01 05 56 06 11 06 52 08 08.8 08 26 09 07		11	III Tr. c. II Im. III Sh. c. III Tr. f. I Tr. c. I Sh. c. III Sh. f. I Tr. f. II E. f. I Sh. f.	03 16 06 19 06 34 06 34 07 57 08 46 09 57 10 12 10 43.8 11 01		18	III Tr. c. II Im. I Tr. c. III Tr. f. III Sh. c. I Sh. c. I Tr. f. I Sh. f. II E. f. III Sh. f.	06 45 08 39 09 45 10 04 10 34 10 41 11 59 12 56 13 18.8 13 57		25	III Tr. c. II Im. I Tr. c. I Sh. c. III Tr. f. I Tr. f. III Sh. c. I Sh. f. II E. f. III Sh. f.	10 20 11 02 11 34 12 36 13 38 13 48 14 34 14 51 15 53.9 17 57	
5	I Im. I E. f. II Tr. c. II Sh. c.	03 21 06 20.9 22 27 23 55		12	I Im. I E. f.	05 08 08 16.2		19	I Im. I E. f.	06 56 10 11.7		26	I Im. I E. f.	08 46 12 07.2	
6	I Tr. c. II Tr. f. I Sh. c. II Sh. f. I Tr. f. I Sh. f. IV Im. IV Em. IV E. c. I Im. IV E. f.	00 38 01 15 01 20 02 44 02 52 03 35 12 07 15 04 19 03.3 21 48 22 16.3		13	II Tr. c. I Tr. c. II Sh. c. I Sh. c. II Tr. f. I Tr. f. II Sh. f. I Sh. f. I Im.	00 48 02 24 02 33 03 15 03 36 04 39 05 22 05 30 23 35		20	II Tr. c. I Tr. c. I Sh. c. II Sh. c. II Tr. f. I Tr. f. I Sh. f. II Sh. f.	03 12 04 12 05 10 05 11 05 59 06 26 07 25 08 00		27	II Tr. c. I Tr. c. I Sh. c. II Tr. f. I Tr. f. II Sh. c. I Sh. f. II Tr. f. I Tr. f. II Sh. f.	05 38 06 01 07 04 07 49 08 15 08 25 09 19 10 38	
7	I E. f. III Im. II Im. I Tr. c. III E. f. I Sh. c. I Tr. f. II E. f. I Sh. f.	00 49.8 13 23 17 10 19 04 19 48.6 19 49 21 19 21 26.3 22 04		14	I E. f. III Im. II Im. III Em. IV Tr. c. III E. c. I Tr. c. I Sh. c. I Tr. f. IV Tr. f. III E. f. I Sh. f.	02 45.2 16 50 19 29 20 10 20 24 20 24.3 20 51 21 44 23 06 23 20 23 48.8 23 59		21	I Im. I E. f. III Im. II Im. I Tr. c. I Sh. c. III Em.	01 24 04 40.6 20 21 21 50 22 39 23 38 23 42		28	I Im. I E. f. III Im.	03 13 06 36.1 23 58	
I.			II.			III.			IV.						
Feb. 1, $x_1 = +1.5$; $y_1 = +0.2$			Feb. 4, $x_1 = +1.9$; $y_1 = +0.2$			Feb. 14, $x_1 = +1.0$; $y_1 = +0.4$			Feb. 6, $x_1 = +2.2$; $y_1 = +0.7$						
Feb. 15, $x_2 = +1.8$; $y_2 = +0.2$			Feb. 15, $x_2 = +2.2$; $y_2 = +0.2$			Feb. 14, $x_2 = +2.9$; $y_2 = +0.4$			Feb. 6, $x_2 = +3.5$; $y_2 = +0.0$						

I.
Feb. 1, $x_2 = +1.5$; $y_2 = +0.2$
Feb. 15, $x_2 = +1.8$; $y_2 = +0.2$

II.
Feb. 4, $x_2 = +1.9$; $y_2 = +0.2$
Feb. 15, $x_2 = +2.2$; $y_2 = +0.2$

III.
Feb. 14, $x_1 = +1.0$; $y_1 = +0.4$
Feb. 14, $x_2 = +2.9$; $y_2 = +0.4$

IV.
Feb. 6, $x_1 = +2.2$; $y_1 = +0.7$
Feb. 6, $x_2 = +3.5$; $y_2 = +0.7$

Eclipse commences - - - E. c.
Eclipse finishes - - - E. f.
Occultation, immersion - - - Im.
Occultation, emersion - - - Em.

Transit commences - - - Tr. c.
Transit finishes - - - Tr. f.
Shadow commences - - - Sh. c.
Shadow finishes - - - Sh. f.

FEBRUARY.

Configurations at 22 ^h 45 ^m .			
Day.	West.		East.
1	4°	○	2° 1° 3°
2	4°	2° 1° ○	3°
3	4°	2° 3° ○ 1°	
4	4° 3°	1° ○	2°
5	3°	4° ○ 1°	2° ○
6	● 1°	2° 3° ○	4°
7		1° ○ 2° 3°	4°
8		○ 1° 2° 3° 4°	
9		2° 1° ○	3° 4°
10		2° ○ 3° 1°	4°
11		3° 1° ○	2° 4°
12		3° 2° ○ 1°	4°
13		2° 3° ○ 1°	4°
14	1° ○ 4° ○	○	● 3° ● 2°
15		4° ○	1° 2° 3°
16	4°	2° 1° ○	3°
17	4°	2° ○	3° 1°
18	4°	3° 1° ○	2°
19	4° 3°	○ 2° 1°	
20	4°	2° 3° 1° ○	
21	● 2°	4° ○	● 3° 1° ○
22		4° ○	2° 3° ● 1°
23		2° 1° ○	4° 3°
24		2° ○	3° 1° 4°
25		3° 1° ○	2° 4°
26	3°	○ 2° 1°	4°
27	3° 2°	1° ○	4°
28		2° ○ 3° 1°	4°

PHASES OF THE ECLIPSES.

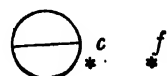
I



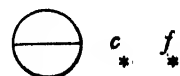
II



III



IV



MARCH.

Day		h m	Day		h m	Day		h m	Day		h m
1	II Im.	00 14	8	I Sh. f.	05 43	16	I Im.	01 24	24	I Tr. f.	02 46
	I Tr. c.	00 28		III Em.	07 01		I E. f.	04 56.1		I Sh. f.	04 01
	I Sh. c.	01 33		II E. f.	07 46.8		I Tr. c.	22 38		II Sh. c.	05 02
	I Tr. f.	02 43		III E. c.	08 25.0		I Sh. c.	23 51		II Tr. f.	05 15
	III Em.	03 19		III E. f.	11 51.6		II Tr. c.	23 53		II Sh. f.	07 52
	I Sh. f.	03 48		I Im.	23 32					I Im.	21 46
	III E. c.	04 24.1				17	I Tr. f.	00 53	25	I E. f.	01 20.7
	II E. f.	05 11.5		I E. f.	03 00.5		I Sh. f.	02 06		I Tr. c.	19 00
	III E. f.	07 50.0		I Tr. c.	20 47		II Sh. c.	02 24		I Sh. c.	20 15
	I Im.	21 41		II Tr. c.	21 22		II Tr. f.	02 41		II Im.	20 55
				I Sh. c.	21 57		II Sh. f.	05 14		I Tr. f.	21 14
2	I E. f.	01 04.9		I Tr. f.	23 01		I Im.	19 52		I Sh. f.	22 30
	II Tr. c.	18 52		II Sh. c.	23 46		I E. f.	23 25.1			
	I Tr. c.	18 56				18	I Tr. c.	17 07	26	III Tr. c.	01 24
	I Sh. c.	20 02		II Tr. f.	00 09		I Sh. c.	18 20		II E. f.	02 15.3
	II Sh. c.	21 08		I Sh. f.	00 11		II Im.	18 23		III Tr. f.	04 43
	I Tr. f.	21 10		II Sh. f.	02 36		I Tr. f.	19 21		III Sh. c.	06 32
	II Tr. f.	21 39		I Im.	18 00		I Sh. f.	20 35		III Sh. f.	09 58
	I Sh. f.	22 17		I E. f.	21 29.5		III Tr. c.	21 31		I Im.	16 15
	II Sh. f.	23 58					II E. f.	23 39.8		I E. f.	19 49.5
3	IV Tr. c.	12 13	11	I Tr. c.	15 14	19	III Tr. f.	00 50	27	I Tr. c.	13 28
	IV Tr. f.	15 11		II Im.	15 54		III Sh. c.	02 32		I Sh. c.	14 44
	I Im.	16 08		I Sh. c.	16 25		III Sh. f.	05 58		I Tr. f.	15 43
	I E. f.	19 33.9		I Tr. f.	17 29		I Im.	14 20		II Tr. c.	15 45
	IV Sh. c.	22 35		III Tr. c.	17 43		I E. f.	17 53.9		I Sh. f.	16 59
				I Sh. f.	18 40					II Sh. c.	18 21
4	IV Sh. f.	01 59		IV Im.	19 44	20	IV Tr. c.	05 02	28	I Im.	10 43
	I Tr. c.	13 23		III Tr. f.	21 01		IV Tr. f.	08 05		IV Im.	13 02
	II Im.	13 27		II E. f.	21 04.4		I Tr. c.	11 35		I E. f.	14 18.5
	III Tr. c.	13 59		III Sh. c.	22 33		I Sh. c.	12 49		IV Em.	16 10
	I Sh. c.	14 30		IV Em.	22 47		II Tr. c.	13 10	29	IV E. c.	01 13.1
	I Tr. f.	15 38	12	III Sh. f.	01 57		I Tr. f.	13 49		IV E. f.	04 53.0
	I Sh. f.	16 45		IV E. c.	07 09.5		I Sh. f.	15 04		I Tr. c.	07 57
	III Tr. f.	17 17		IV E. f.	10 41.3		II Sh. c.	15 43		I Sh. c.	09 13
	II E. f.	18 29.1		I Im.	12 28		II Tr. f.	15 57		I Tr. f.	10 11
	III Sh. c.	18 33		I E. f.	15 58.3		IV Sh. c.	16 36		II Im.	10 12
	III Sh. f.	21 57					II Sh. f.	18 33		I Sh. f.	11 27
5	I Im.	10 36	13	I Tr. c.	09 42	21	IV Sh. f.	20 08		III Im.	15 14
	I E. f.	14 02.7		II Tr. c.	10 37					II E. f.	15 33.0
				I Sh. c.	10 54	22	I Im.	08 49	30	III Em.	18 30
6	I Tr. c.	07 51		I Tr. f.	11 57		I E. f.	12 22.9		III E. c.	20 25.9
	II Tr. c.	08 00		II Sh. c.	13 05					III E. f.	23 54.3
	I Sh. c.	08 59		I Sh. f.	13 09		I Tr. c.	06 03	31	I Tr. c.	02 25
	I Tr. f.	10 05		II Tr. f.	13 24		I Sh. c.	07 18		I Tr. f.	03 41
	II Sh. c.	10 27		II Sh. f.	15 54		II Im.	07 39		I Tr. f.	04 40
	II Tr. f.	10 53	14	I Im.	06 56		I Tr. f.	08 17		II Tr. c.	05 04
	I Sh. f.	11 14		I E. f.	10 27.3		I Sh. f.	09 33		I Sh. f.	05 56
	II Sh. f.	13 16	15	I Tr. c.	04 10		III Im.	11 19		II Sh. c.	07 40
				II Im.	05 08		II E. f.	12 57.5		II Tr. f.	07 51
7	I Im.	05 04		I Sh. c.	05 23		III Em.	14 40		I Im.	23 41
	I E. f.	08 31.7		I Tr. f.	06 25		III E. c.	16 26.1			
				III Im.	07 27	23	III E. f.	19 53.9			
8	I Tr. c.	02 19		I Sh. f.	07 38		I Im.	03 17			
	II Im.	02 40		II E. f.	10 22.1		I E. f.	06 51.7			
	I Sh. c.	03 28		III Em.	10 48	24					
	III Im.	03 40		III E. c.	12 25.4		I Tr. c.	00 31			
	I Tr. f.	04 33		III E. f.	15 52.7		I Sh. c.	01 46			
							II Tr. c.	02 28			

I.	II.	III.	IV.
Mar. 2, $x_2 = +1.9$; $y_2 = +0.2$	Mar. 1, $x_2 = +2.5$; $y_2 = +0.2$	Mar. 15, $x_1 = +1.8$; $y_1 = +0.4$	Mar. 12, $x_1 = +4.0$; $y_1 = +0.7$
Mar. 16, $x_2 = +2.0$; $y_2 = +0.2$	Mar. 15, $x_2 = +2.7$; $y_2 = +0.2$	Mar. 15, $x_2 = +3.7$; $y_2 = +0.4$	Mar. 12, $x_2 = +5.4$; $y_2 = +0.7$
Eclipse commences - - - E. c.	Transit commences - - - Tr. c.		
Eclipse finishes - - - E. f.	Transit finishes - - - Tr. f.		
Occultation, immersion - - - Im.	Shadow commences - - - Sh. c.		
Occultation, emersion - - - Em.	Shadow finishes - - - Sh. f.		





SATELLITES OF JUPITER, 1931.

601

MARCH.

Configurations at 22 ^h 00 ^m .			
Day.	West.		East.
1	• ● I	○	² 4 ³
2		² ○ I.	4 ³
3		² 4 ³ ○	I 3 ³
4		4 ³ I 3 ³ ○	²
5		4 ³ 3 ³ ○	² I
6		4 ³ 3 ³ 2 ³ I ○	
7		4 ³ ² 3 ³ ○	I
8		4 ³ I ○	² 3 ³
9	I ○	4 ³ ○	3 ³ 2 ○
10		² 4 ³ ○	I 3 ³
11		I 3 ³ ○	² ● 4 ³
12		3 ³ ○	I 2 ³ 4 ³
13		3 ³ 2 ³ I ○	4 ³
14		² 3 ³ ○	I 4 ³
15		I ○	3 ³ 2 ³ 4 ³
16		² I ○	3 ³ 4 ³
17		2 ³ ○	3 ³ 4 ³ ● I
18		I ○	4 ³ 3 ○ ● 2 ³
19		3 ³ ○	4 ³ I 2 ³
20		3 ³ 4 ³ I ○	
21		4 ³ ² 3 ³ ○	I
22		4 ³ I ○	3 ³ 2 ³
23		4 ³ ○	² I 3 ³
24	• ● I	4 ³ 2 ³ ○	3 ³
25	• ● 2	4 ³ I ○	3 ³
26		4 ³ 3 ³ ○	I 2 ³
27		3 ³ I 2 ³ ○	
28		3 ³ 2 ³ ○	4 ³ I
29		I ○	2 ³ 4 ³ ● 3 ³
30		○	² I 3 ³ 4 ³
31		2 ³ I ○	3 ³ 4 ³

PHASES OF THE ECLIPSES.

I	 *f	II	 *
III	 c * f	IV	 c * f *

APRIL.

Day	I	E. f.	h	m	Day	I	Sh. c.	h	m	Day	I	Sh. f.	h	m	Day	II	E. f.	h	m
1	I	E. f.	03	16.3	9	I	Sh. c.	00	05	16	I	Sh. f.	04	15	23	II	E. f.	12	38.6
	I	Tr. c.	20	54		I	Tr. f.	01	04		II	Im.	04	42		III	Tr. c.	17	37
	I	Sh. c.	22	10		II	Im.	02	05		II	E. f.	10	02.2		III	Tr. f.	20	59
	I	Tr. f.	23	08		I	Sh. f.	02	20		III	Tr. c.	13	28		III	Sh. c.	22	32
	II	Im.	23	29		II	E. f.	07	26.4		III	Tr. f.	16	50					
						III	Tr. c.	09	23		III	Sh. c.	18	33	24	I	Im.	00	00
2	I	Sh. f.	00	25		III	Tr. f.	12	43		III	Sh. f.	22	00		III	Sh. f.	02	00
	II	E. f.	04	50.8		III	Sh. c.	14	32		I	Im.	22	02		I	E. f.	03	31.6
	III	Tr. c.	05	22		III	Sh. f.	17	59		I	Tr. c.	21	29		I	Tr. c.	21	12
	III	Tr. f.	08	41		I	Im.	20	06		I	Sh. c.	20	29		I	Sh. c.	22	24
	III	Sh. c.	10	31		I	E. f.	23	40.6	17	I	Tr. c.	19	15		I	Tr. f.	23	27
	III	Sh. f.	13	59							I	Sh. f.	21	29					
	I	Im.	18	10							II	Tr. c.	23	42	25	I	Sh. f.	00	39
	I	E. f.	21	45.1	10	I	Tr. c.	17	18		I	Sh. f.	22	44		II	Tr. c.	02	25
						I	Sh. c.	18	34		II	Tr. c.	23	42		II	Sh. c.	04	52
						I	Tr. f.	19	33							II	Tr. f.	05	13
						I	Sh. f.	20	49		II	Sh. c.	02	14		II	Sh. f.	07	42
3	I	Tr. c.	15	23		II	Tr. c.	21	01	18	II	Tr. f.	02	30		I	Im.	18	30
	I	Sh. c.	16	39		II	Sh. c.	23	37		II	Sh. f.	05	05		I	E. f.	22	00.5
	I	Tr. f.	17	37		II	Tr. f.	23	49		I	Im.	16	32					
	II	Tr. c.	18	22							I	E. f.	20	05.1	26	I	Tr. c.	15	41
	I	Sh. f.	18	54		II	Sh. f.	02	27							I	Sh. c.	16	52
	II	Sh. c.	20	59	11	I	Im.	14	35		I	Tr. c.	13	44		I	Tr. f.	17	56
	II	Tr. f.	21	10		I	E. f.	18	09.6	19	I	Sh. c.	14	57		I	Sh. f.	19	08
	II	Sh. f.	23	49							I	Tr. f.	15	58		II	Im.	20	42
											I	Sh. f.	17	13					
4	I	Im.	12	39	12	I	Tr. c.	11	47		II	Im.	18	02	27	II	E. f.	01	55.9
	I	E. f.	16	14.0		I	Sh. c.	13	03		III	Im.	03	24		III	Im.	07	35
						I	Tr. f.	14	02		III	Em.	06	48		III	Em.	11	00
						I	Sh. f.	15	18		III	E. c.	08	25.6		III	E. c.	12	26.4
5	I	Tr. c.	09	52		II	Im.	15	23		III	E. f.	11	01		I	Im.	12	59
	I	Sh. c.	11	08		II	E. f.	20	44.3	20	III	E. f.	11	55.7		III	E. f.	15	57.1
	I	Tr. f.	12	06		III	Im.	23	16		I	E. f.	14	33.9	28	I	E. f.	16	29.3
	II	Im.	12	46												I	Tr. c.	10	11
	I	Sh. f.	13	23		III	Em.	02	40		I	Tr. c.	08	13		I	Sh. c.	11	21
	II	E. f.	18	08.6	13	III	E. c.	04	25.5		I	Sh. c.	09	26		I	Tr. f.	12	26
	III	Im.	19	13		III	E. f.	07	55.1		I	Tr. f.	10	28		I	Sh. f.	13	37
	III	Em.	22	36		I	Im.	09	04		II	Tr. c.	13	04		II	Tr. c.	15	47
	IV	Tr. c.	22	47		I	E. f.	12	38.4	21	II	Sh. c.	15	33		II	Sh. c.	18	11
											II	Tr. f.	15	52		II	Tr. f.	18	35
6	III	E. c.	00	25.6	14	I	Tr. c.	06	16		II	Sh. f.	18	24		II	Sh. f.	21	01
	IV	Tr. f.	01	56		IV	Im.	07	15						29	I	Im.	07	29
	III	E. f.	03	54.6		I	Sh. c.	07	31		I	Im.	05	31		I	E. f.	10	58.2
	I	Im.	07	08		I	Tr. f.	08	31		I	E. f.	09	02.8	30	I	Tr. c.	04	40
	IV	Sh. c.	10	37		I	Sh. f.	09	46		IV	Tr. c.	17	20		I	Sh. c.	05	50
	I	E. f.	10	42.9		II	Tr. c.	10	22		IV	Tr. f.	20	36		I	Tr. f.	06	55
	IV	Sh. f.	14	17		IV	Em.	10	31							I	Sh. f.	08	05
						II	Sh. c.	12	56	22						II	Im.	10	03
7	I	Tr. c.	04	20		II	Tr. f.	13	10		I	Tr. c.	02	42		II	E. f.	15	13.9
	I	Sh. c.	05	36		II	Sh. f.	15	46		IV	Sh. c.	04	39		III	Tr. c.	21	48
	I	Tr. f.	06	35		IV	E. c.	19	17.3		I	Tr. f.	04	57					
	II	Tr. c.	07	42		IV	E. f.	23	04.9	23	I	Sh. f.	06	10					
	I	Sh. f.	07	51							II	Im.	07	22					
	II	Sh. c.	10	18							IV	Sh. f.	08	25					
	II	Tr. f.	10	30	15	I	Im.	03	33										
	II	Sh. f.	13	08		I	E. f.	07	07.3										
8	I	Im.	01	37	16	I	Tr. c.	00	45										
	I	E. f.	05	11.8		I	Sh. c.	02	00										
	I	Tr. c.	22	49		I	Tr. f.	03	00										

I.	II.	III.	IV.
Apr. 1, $x_2 = +2.1$; $y_2 = +0.1$	Apr. 2, $x_2 = +2.8$; $y_2 = +0.2$	Apr. 13, $x_1 = +1.9$; $y_1 = +0.4$	Apr. 14, $x_1 = +4.2$; $y_1 = +0.7$
Apr. 15, $x_2 = +2.1$; $y_2 = +0.1$	Apr. 16, $x_2 = +2.7$; $y_2 = +0.2$	Apr. 13, $x_2 = +3.8$; $y_2 = +0.3$	Apr. 14, $x_2 = +5.7$; $y_2 = +0.7$
Eclipse commences - - - E. c.		Transit commences - - - Tr. c.	
Eclipse finishes - - - E. f.		Transit finishes - - - Tr. f.	
Occultation, immersion - - Im.		Shadow commences - - - Sh. c.	
Occultation, emersion - - Em.		Shadow finishes - - - Sh. f.	

SATELLITES OF JUPITER, 1931.

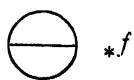
603

APRIL.

Configurations at 21 ^h 30 ^m .				
Day.	West.		East.	
1		2 3	4	1 0
2	3	0	2 4	1
3	3	1 2 0	4	
4	3 2	0	1 4	
5		1 4 0	2	3
6	4	0	1 2 3	
7	4	2 1 0	3	
8	4	2 1 0	3	
9	4	3 0	2	1
10	4 3	1 0		2 0
11	4 3 2	0	1	
12	4	1 3 0	2	
13		4 0	1 2 3	
14		2 1 0	3	4
15		2 0 1	3 4	
16		3 0 1	2 4	
17	3	1 0 2	4	
18	3 2	0	1 4	
19		1 3 0	4	2
20		0	1 2 3 4	
21		2 1 0	4 3	
22		2 4 0	1 3	
23	4	3 1 0	2	
24	4 3	0 2		1 0
25	4	3 2 0		1
26	2 4	1 3 0		
27	4	0	1 2 3	
28	4	1 2 0	3	
29	4 2	0	1 3	
30		1 3 4 0	2	

PHASES OF THE ECLIPSES.

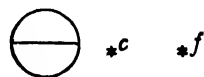
I



II



III



IV



MAY.

Day	III Tr. f.	h m	Day	I Tr. c.	h m	Day	II Sh. c.	h m	Day	I Im.	h m
1	I Im.	01 11	9	I Sh. c.	01 08	16	II Tr. f.	12 43	24	I E. f.	02 27
	IV Im.	02 13		I Tr. f.	02 14		II Sh. f.	13 28		I Tr. c.	05 41.5
	III Sh. c.	02 32		I Sh. f.	03 23			15 34			23 37
	I E. f.	05 27.0		II Tr. c.	04 29	17	I Im.	00 27	25	I Sh. c.	00 32
	IV Em.	05 38		II Sh. c.	07 53		I E. f.	03 46.4		I Tr. f.	01 52
	III Sh. f.	06 01		II Tr. f.	10 06		I Tr. c.	21 37		I Sh. f.	02 48
	IV E. c.	13 20.6		IV Tr. c.	12 33		IV Im.	21 47		II Im.	07 37
	IV E. f.	17 15.6		II Sh. f.	12 57		I Sh. c.	22 37		II E. f.	12 20.3
	I Tr. c.	23 10		IV Tr. f.	15 59		I Tr. f.	23 53		I Im.	20 57
				I Im.	22 27	18	I Sh. f.	00 53	26	I E. f.	00 10.2
2	I Sh. c.	00 19		IV Sh. c.	22 40		IV Em.	01 22		III Im.	00 43
	I Tr. f.	01 25	10	I E. f.	01 51.2		II Im.	04 52		III Em.	04 11
	I Sh. f.	02 34		IV Sh. f.	02 33		IV E. c.	07 23.9		III E. c.	04 25.7
	II Tr. c.	05 08		I Tr. c.	19 38		II E. f.	09 44.0		III E. f.	07 58.3
	II Sh. c.	07 29		I Sh. c.	20 42		IV E. f.	11 25.5		IV Tr. c.	08 16
	II Tr. f.	07 57		I Tr. f.	21 53		I Im.	18 57		IV Tr. f.	11 53
	II Sh. f.	10 19		I Sh. f.	22 58		III Im.	20 23		IV Sh. c.	16 40
	I Im.	20 28					I E. f.	22 15.1		I Tr. c.	18 07
	I E. f.	23 55.9					III Em.	23 50		I Sh. c.	19 01
3	I Tr. c.	17 39	11	II Im.	02 07	19	III E. c.	00 26.4		I Tr. f.	20 23
	I Sh. c.	18 47		II E. f.	07 07.9		III E. f.	03 58.6		IV Sh. f.	20 41
	I Tr. f.	19 54		III Im.	16 05		I Tr. c.	16 07		I Sh. f.	21 17
	I Sh. f.	21 03		I Im.	16 57		I Sh. c.	17 06	27	II Tr. c.	02 50
	II Im.	23 24		III Em.	19 31		I Tr. f.	18 23		II Sh. c.	04 39
4	II E. f.	04 31.9		I E. f.	20 20.0		I Sh. f.	19 22		II Tr. f.	05 39
	III Im.	11 48	12	III E. f.	20 26.9	20	II Tr. c.	00 03		II Sh. f.	07 30
	I Im.	14 58		I Tr. c.	23 58.6		II Sh. c.	02 02		I Im.	15 27
	III Em.	15 14		I Sh. c.	15 11		II Tr. f.	02 52		I E. f.	18 39.0
	III E. c.	16 26.6		I Tr. f.	16 23		II Sh. f.	04 53	28	I Tr. c.	12 37
	I E. f.	18 24.7		I Sh. f.	17 27		I Im.	13 27		I Sh. c.	13 30
	III E. f.	19 57.9		II Tr. c.	21 16		I E. f.	16 44.0		I Tr. f.	14 53
5	I Tr. c.	12 09		II Sh. c.	23 25					I Sh. f.	15 46
	I Sh. c.	13 16	13	II Tr. f.	00 05	21	I Tr. c.	10 37		II Im.	21 00
	I Tr. f.	14 24		II Sh. f.	02 16		I Sh. c.	11 35			
	I Sh. f.	15 32		I Im.	11 27		I Tr. f.	12 52			
	II Tr. c.	18 31		I E. f.	14 48.8		I Sh. f.	13 51			
	II Sh. c.	20 48					II Im.	18 14	29	II E. f.	01 38.3
	II Tr. f.	21 20	14	I Tr. c.	08 37		II E. f.	23 02.1		I Im.	09 57
	II Sh. f.	23 39		I Sh. c.	09 40					I E. f.	13 07.7
6	I Im.	09 28		I Tr. f.	10 53		I Im.	07 57		III Tr. c.	14 59
	I E. f.	12 53.6		I Sh. f.	11 56	22	III Tr. c.	10 38		III Tr. f.	18 27
7	I Tr. c.	06 38		II Im.	15 29		I E. f.	11 12.7		III Sh. c.	18 31
	I Sh. c.	07 45		II E. f.	20 25.9		III Sh. f.	18 02		III Sh. f.	22 02
	I Tr. f.	08 54	15	I Im.	05 57				30	I Tr. c.	07 07
	I Sh. f.	10 01		III Tr. c.	06 19					I Sh. c.	07 58
	II Im.	12 45		I E. f.	09 17.6					I Tr. f.	09 23
	II E. f.	17 49.9		III Tr. f.	09 44					I Sh. f.	10 15
8	III Tr. c.	02 02		III Sh. c.	10 31	23	I Tr. c.	05 07		II Tr. c.	16 13
	I Im.	03 58		III Sh. f.	14 01		I Sh. c.	06 03		II Sh. c.	17 57
	III Tr. f.	05 26	16	I Tr. c.	03 07		I Tr. f.	07 23		II Tr. f.	19 03
	III Sh. c.	06 32		I Sh. c.	04 09		I Sh. f.	08 20		II Sh. f.	20 48
	I E. f.	07 22.3		I Tr. f.	05 23		II Tr. c.	13 26			
	III Sh. f.	10 01		I Sh. f.	06 25		II Sh. c.	15 20			
				II Tr. c.	10 39		II Tr. f.	16 15	31	I Im.	04 28
							II Sh. f.	18 11		I E. f.	07 36.5

I.	II.	III.	IV.
May 1, $x_1 = +2.0$; $y_1 = +0.1$	May 4, $x_2 = +2.6$; $y_2 = +0.2$	May 19, $x_1 = +1.3$; $y_1 = +0.3$	May 18, $x_1 = +3.2$; $y_1 = +0.6$
May 17, $x_2 = +1.9$; $y_2 = +0.1$	May 14, $x_2 = +2.4$; $y_2 = +0.2$	May 19, $x_2 = +3.2$; $y_2 = +0.3$	May 18, $x_2 = +4.8$; $y_2 = +0.6$

Eclipse commences - - - E. c.
 Eclipse finishes - - - E. f.
 Occultation, immersion - - - Im.
 Occultation, emersion - - - Em.

Transit commences - - - Tr. c.
 Transit finishes - - - Tr. f.
 Shadow commences - - - Sh. c.
 Shadow finishes - - - Sh. f.

SATELLITES OF JUPITER, 1931.





605

MAY.

Configurations at 21^h 00^m.

Day.	West.	East.
1	3°	○ 1° 2° 4°
2	● 1° 3° 2°	○ 4°
3	3° 1° 2°	○ 4°
4		○ 1° 3° 2° 4°
5	2° ○	○ 1° 3° 4°
6	2°	○ 1° 3° 4°
7	1°	○ 3° 2° 4°
8	3°	○ 1° 4° 3°
9	3° 2° 4° 1°	○
10	1° ○ 4° 3° 2°	○
11	4°	○ 1° 2° ● 3°
12	4°	○ 1° 2° 3°
13	4° 2°	○ 1° 3°
14	4° 1°	○ 2° 3°
15	4° 3°	○ 1° 2°
16	3° 4° 2° 1°	○
17	3° 2° 1°	○ 4°
18	● 3°	○ 2° 4° ● 1°
19	1°	○ 2° 3° 4°
20	2°	○ 1° 3° 4°
21	1°	○ 3° 4° ● 2°
22	3°	○ 1° 2° 4°
23	3° 2° 1°	○ 4°
24	3° 2°	○ 1° 4°
25	● 1°	○ 3° 4° 2°
26	4° 1°	○ 2° 3°
27	4° 2°	○ 1° 3°
28	4° 1°	○ 2° 3°
29	4°	○ 3° 1° 2°
30	4° 3° 1° 2°	○
31	4° 3° 2°	○ 1°

PHASES OF THE ECLIPSES.

I	 f_*	II	 $*f$
III	 $*^c$ $*f$	IV	 $*^c$ $*f$

JUNE.

Day	I	h	m	Day	I	h	m	Day	II	h	m	Day	II	h	m
1	I Tr. c.	01 37		7	I Im.	06 28		14	II Tr. f.	00 40		21	II Tr. c.	00 38	
	I Sh. c.	02 27			I E. f.	09 31.5			II Sh. f.	02 01			II Sh. c.	01 45	
	I Tr. f.	03 53							I Im.	08 29			II Tr. f.	03 29	
	I Sh. f.	04 44							I E. f.	11 26.2			II Sh. f.	04 37	
	II Im.	10 24		8	I Tr. c.	03 37		15	I Tr. c.	05 38		22	I Tr. c.	07 39	
	II E. f.	14 56.6			I Sh. c.	04 22			I Sh. c.	06 17			I Sh. c.	08 11	
	I Im.	22 58			I Tr. f.	05 54			I Tr. f.	07 55			I Tr. f.	09 50	
2	I E. f.	02 05.2			I Sh. f.	06 39			I Sh. f.	08 34			I Sh. f.	10 20	
	III Im.	05 04			II Im.	13 11			II Im.	16 00			II Im.	18 49	
	III E. f.	11 58.2		9	I Im.	00 58		16	I Im.	02 59		23	I Im.	05 01	
	I Tr. c.	20 07			I E. f.	04 00.1			I E. f.	05 54.9			I E. f.	07 49.5	
	I Sh. c.	20 56			III Im.	09 28			III Im.	13 53			III Im.	18 19	
	I Tr. f.	22 23			III E. f.	15 58.2			III E. f.	19 58.9			III E. f.	23 58.8	
	I Sh. f.	23 12			I Tr. c.	22 07		17	I Tr. c.	00 08		24	I Tr. c.	02 09	
					I Sh. c.	22 51			I Sh. c.	00 45			I Sh. c.	02 40	
3	II Tr. c.	05 37		10	I Tr. f.	00 24			I Tr. f.	02 25			I Tr. f.	04 26	
	II Sh. c.	07 15			I Sh. f.	01 08			I Sh. f.	03 02			I Sh. f.	04 57	
	II Tr. f.	08 27			II Tr. c.	08 25			II Tr. c.	11 14			II Tr. c.	14 03	
	II Sh. f.	10 07			II Sh. c.	09 51			II Sh. c.	12 27			II Sh. c.	15 03	
	I Im.	17 28			II Tr. f.	11 16			II Tr. f.	14 05			II Tr. f.	16 54	
	IV Im.	17 49			II Sh. f.	12 43			II Sh. f.	15 19			II Sh. f.	17 55	
	I E. f.	20 34.0			I Im.	19 29		18	I E. f.	00 23.6		25	I E. f.	02 18.2	
	IV Em.	21 35			I E. f.	22 28.9			I Tr. c.	18 39			I Tr. c.	20 40	
4	IV E. c.	01 27.6		11	I Tr. c.	16 38			I Sh. c.	19 14			I Sh. c.	21 09	
	IV E. f.	05 35.4			I Sh. c.	17 19			I Tr. f.	20 55			I Tr. f.	22 57	
	I Tr. c.	14 37			I Tr. f.	18 54		19	I Sh. f.	21 31		26	I Sh. f.	23 26	
	I Sh. c.	15 24			I Sh. f.	19 36			II Im.	05 24			II Im.	08 13	
	I Tr. f.	16 53		12	II Im.	02 35			II E. f.	09 27.4			II E. f.	12 03.9	
	I Sh. f.	17 41			IV Tr. c.	04 21			I Im.	16 00			I Im.	18 01	
	II Im.	23 47			II E. f.	06 51.0			I E. f.	18 52.2			I E. f.	20 46.8	
5	II E. f.	04 14.6			IV Tr. f.	08 09		20	III Tr. c.	04 11		27	III Tr. c.	08 37	
	I Im.	11 58			IV Sh. c.	10 41			III Sh. c.	06 30			III Sh. c.	10 29	
	I E. f.	15 02.7			I Im.	13 59			III Tr. f.	07 42			III Tr. f.	12 09	
	III Tr. c.	19 22			IV Sh. f.	14 47			I Tr. c.	13 09			III Sh. f.	14 03	
	III Sh. c.	22 31			I E. f.	16 57.5			I Sh. c.	13 43			I Tr. c.	15 10	
	III Tr. f.	22 51			III Tr. c.	23 46			IV Im.	14 10			I Sh. c.	15 37	
6	III Sh. f.	02 03		13	III Sh. c.	02 30			I Tr. f.	15 26			I Tr. f.	17 27	
	I Tr. c.	09 07			III Tr. f.	03 16			I Sh. f.	16 00			I Sh. f.	17 55	
	I Sh. c.	09 53			III Sh. f.	06 03			IV Em.	18 07					
	I Tr. f.	11 23			I Tr. c.	11 08			IV E. c.	19 30.1					
	I Sh. f.	12 10			I Sh. c.	11 48			IV E. f.	23 43.7					
	II Tr. c.	19 01			I Tr. f.	13 24									
	II Sh. c.	20 33			I Sh. f.	14 05									
	II Tr. f.	21 51			II Tr. c.	21 49									
	II Sh. f.	23 25			II Sh. c.	23 09									
I.				II.				III.				IV.			
June 2, $x_2 = +1.7$; $y_2 = +0.1$				June 1, $x_2 = +2.1$; $y_2 = +0.2$				June 16, $x_2 = +2.4$; $y_2 = +0.3$				June 20, $x_2 = +1.4$; $y_2 = +0.6$			
June 16, $x_2 = +1.5$; $y_2 = +0.1$				June 15, $x_2 = +1.9$; $y_2 = +0.2$								June 20, $x_2 = +3.1$; $y_2 = +0.6$			
Eclipse commences - - E. c.				Transit commences - - Tr. c.				Shadow commences - - Sh. c.							
Eclipse finishes - - E. f.				Transit finishes - - Tr. f.				Shadow finishes - - Sh. f.							
Occultation, immersion - Im.															
Occultation, emersion - Em.															

SATELLITES OF JUPITER, 1931.

607

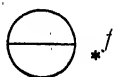
JUNE.

Configurations at 20^h 30^m.

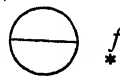
Day.	West.		East.	
1	4	3 1	2	
2		4	2 3	1
3		2	3	4 1
4		2	3 4	
5			1 2	3
6	2	3 1	4	
7		3 2	1	4
8		3 1	2	4
9			1 3 2	4
10		2	4 3	1
11		1 2	4 3	
12		4	3 1 2	
13		4 3 1	2	
14		4 3 2	1	
15	4	3 1	2	
16	4		1 3 2	
17	4	2	1 3	
18	1	4 2	3	
19		4	1 3 2	
20		3 1	2	4
21		3 2	1 4	
22		3 1	4	2
23			1 2 4	3
24		2 1	3 4	
25		2	1 3 4	
26			3 2 4	1
27		3 1	2 4	

PHASES OF THE ECLIPSES.

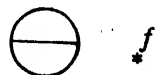
I



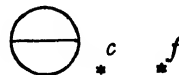
II



III



IV



SATELLITES OF JUPITER, 1931.

AUGUST.

Jupiter being near the Sun the Phenomena of the Satellites
are not given from June 28 until August 11.

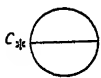
Day		h	m	Day		h	m	Day		h	m	Day		h	m
12	I Sh. c.	16	02	17	I E. c.	02	17	22	II Em.	09	53	27	III E. c.	08	14
	I Tr. c.	16	20		I Em.	04	56		I Em.	12	27		III Em.	14	01
	I Sh. f.	18	20		I Sh. c.	23	28						II Sh. c.	14	15
	I Tr. f.	18	38		I Tr. c.	23	50						II Tr. c.	15	18
13	III E. c.	00	17	18	I Sh. f.	01	46	23	I Sh. c.	06	53		II Sh. f.	17	06
	III Em.	05	08		I Tr. f.	02	09		I Tr. c.	07	21		I E. c.	17	07
	II Sh. c.	09	07		IV Sh. c.	10	39		I Sh. f.	09	11		II Tr. f.	18	09
	II Tr. c.	09	43		IV Tr. c.	14	18		I Tr. f.	09	39		I Em.	19	57
	II Sh. f.	11	59		IV Sh. f.	15	04		III Sh. c.	18	22				
	II Tr. f.	12	35		II E. c.	16	44		III Tr. c.	20	17				
	I E. c.	13	20		IV Tr. f.	18	46		III Sh. f.	21	59	28	I Sh. c.	14	19
	I Em.	15	56		II Em.	20	28		III Tr. f.	23	54		I Tr. c.	14	52
14	I Sh. c.	10	30		I E. c.	20	45	24	II Sh. c.	00	58		I Sh. f.	16	37
	I Tr. c.	10	50		I Em.	23	26		II Tr. c.	01	54		I Tr. f.	17	10
	I Sh. f.	12	48	19	I Sh. c.	17	56		II Sh. f.	03	49	29	II E. c.	08	39
	I Tr. f.	13	08		I Tr. c.	18	21		I E. c.	04	10		I E. c.	11	35
15	II E. c.	03	25		I Sh. f.	20	14		II Tr. f.	04	46		II Em.	12	43
	II Em.	07	02		I Tr. f.	20	39		I Em.	06	57		I Em.	14	27
	I E. c.	07	48	20	III E. c.	04	16	25	I Sh. c.	01	22	30	I Sh. c.	08	48
	I Em.	10	26		III Em.	09	35		I Tr. c.	01	51		I Tr. c.	09	22
16	I Sh. c.	04	59		III Sh. c.	11	41		I Sh. f.	03	40		I Sh. f.	11	06
	I Tr. c.	05	20		II Tr. c.	12	31		I Tr. f.	04	10		I Tr. f.	11	40
	I Sh. f.	07	17		II Sh. f.	14	32		II E. c.	19	21		III Sh. c.	22	21
	I Tr. f.	07	38		I E. c.	15	13		I E. c.	22	39	31	III Tr. c.	00	43
	III Sh. c.	14	23		II Tr. f.	15	22	26	II Em.	23	18		III Sh. f.	01	58
	III Tr. c.	15	51		I Em.	17	57		I Em.	01	27		II Sh. c.	03	32
	III Sh. f.	18	00	21	I Sh. c.	12	25		IV E. c.	19	36		III Tr. f.	04	21
	III Tr. f.	19	28		I Tr. c.	12	51		I Sh. c.	19	51		II Tr. c.	04	41
	II Sh. c.	22	24		I Sh. f.	14	43		I Tr. c.	20	22		I E. c.	06	04
	II Tr. c.	23	07		I Tr. f.	15	09		I Sh. f.	22	08		II Sh. f.	06	23
17	II Sh. f.	01	16	22	II E. c.	06	02	27	I Tr. f.	22	40		II Tr. f.	07	33
	II Tr. f.	01	59		I E. c.	09	42		IV E. f.	00	09		I Em.	08	57
									IV Im.	00	38				
									IV Em.	05	15				
I.				II.				III.				IV.			
Aug. 17, $x_1 = -1.3$; $y_1 = +0.1$				Aug. 15, $x_1 = -1.5$; $y_1 = +0.1$				Aug. 13, $x_1 = -1.7$; $y_1 = +0.1$				No eclipse.			

609

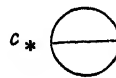
Configurations at 04^h 15^m.

Day.	West.	East.
I2	'3 ○ 'I '2 '4	
I3	'I ○ 2° '4 ● '3	
I4	2° ○ I° '3 '4	
I5	● '2 'I ○ 3° 4°	
I6	I ○ ° 3° 2° 4°	
I7	3° 2° ○ 4° ● 'I	
I8	3° '2 I° ○ 4°	
I9	'3 4° ○ 'I '2	
20	4° I° · ○ 3 2°	
2I	4° 2° ○ I° '3	
22	4° 'I '2 ○ 3°	
23	'4 ○ I° 3° '2	
24	● 'I 2° ○ '4 3° ○	
25	'4 3° '2 I° ○	
26	'3 '4 ○ '2 'I	
27	I° '3 ○ 2° ● '4	
28	2° ○ 'I '3 '4	
29	'I '2 ○ '3 '4	
30	○ I° 3° '2 '4	
3I	3° ○ 'I '2 ○ '4	

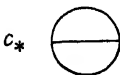
I



II



III



IV

No eclipse of this Satellite.

SEPTEMBER.

Day		h	m	Day		h	m	Day		h	m	Day		h	m
1	I Sh. c.	03	16	9	II E. c.	00	34 ²	17	I Sh. c.	01	33	25	III E. c.	00	06 ⁹
	I Tr. c.	03	52		I E. c.	02	26 ²		I Tr. c.	02	23		II Sh. c.	00	29
	I Sh. f.	05	34		II Em.	04	58		I Sh. f.	03	51		I E. c.	00	41 ¹
	I Tr. f.	06	10		I Em.	05	26		I Tr. f.	04	41		II Tr. c.	02	18
	II E. c.	21	57 ⁷		I Sh. c.	23	39		III E. c.	20	08 ¹		II Sh. f.	03	20
2	I E. c.	00	32 ⁷	10	I Tr. c.	00	23	18	II Sh. f.	00	47	26	III E. f.	03	45 ¹
	II Em.	02	08		I Sh. f.	01	57		I Em.	01	55		III Im.	03	53
	I Em.	03	27		I Tr. f.	02	41		II Tr. c.	22	47 ⁹		I Em.	03	54
	I Sh. c.	21	45		III E. c.	16	09 ⁹	19	II Sh. f.	01	55		II Tr. f.	05	10
	I Tr. c.	22	22		II Sh. c.	19	22		II Tr. f.	02	26		III Em.	07	32
3	I Sh. f.	00	03		II Tr. c.	20	50		III Em.	03	11		I Sh. c.	21	56
	I Tr. f.	00	41		I E. c.	20	54 ⁵		I Tr. c.	22	19		I Tr. c.	22	52
	III E. c.	12	11 ⁹		II Sh. f.	22	14	20	I Sh. c.	20	02	26	I Sh. f.	00	13
	II Sh. c.	16	49		III Em.	22	49		I Tr. c.	20	53		I Tr. f.	01	10
	II Tr. c.	18	04		II Tr. f.	23	41		I Sh. f.	22	19		II E. c.	19	04 ⁷
	III Em.	18	25		I Em.	23	56		I Tr. f.	23	10		I E. c.	19	09 ⁵
	I E. c.	19	01 ¹	11	I Sh. c.	18	07	19	II E. c.	16	28 ³		I Em.	22	24
	II Sh. f.	19	40		I Tr. c.	18	53		I E. c.	17	16 ²	27	II Em.	23	57
	II Tr. f.	20	56		I Sh. f.	20	25		I Em.	20	25		I Sh. c.	16	24
	I Em.	21	57		I Tr. f.	21	11		II Em.	21	10		I Tr. c.	17	22
4	IV Sh. c.	04	38	12	IV E. c.	13	37 ⁸	20	I Sh. c.	14	30	28	I Sh. f.	18	42
	IV Sh. f.	09	07		II E. c.	13	51 ⁹		I Tr. c.	15	22		I Tr. f.	19	39
	IV Tr. c.	10	39		I E. c.	15	22 ⁹		I Sh. f.	16	48		I E. c.	13	37 ⁸
	IV Tr. f.	15	14		IV E. f.	18	13 ⁹		I Tr. f.	17	40		II Sh. c.	13	46
	I Sh. c.	16	13		II Em.	18	22		IV Sh. c.	22	36		III Sh. c.	14	16
	I Tr. c.	16	53		I Em.	18	26	21	IV Sh. f.	03	08		II Tr. c.	15	40
	I Sh. f.	18	31		IV Im.	21	00		IV Tr. c.	06	45		II Sh. f.	16	37
	I Tr. f.	19	11						III Sh. c.	10	18		I Em.	16	53
5	II E. c.	11	15 ⁵	13	IV Em.	01	44		II Sh. c.	11	13		III Sh. f.	17	53
	I E. c.	13	29 ⁴		I Sh. c.	12	36		IV Tr. f.	11	25		III Tr. c.	18	11
	II Em.	15	33		I Tr. c.	13	23		I E. c.	11	44 ⁵		II Tr. f.	18	31
	I Em.	16	26		I Sh. f.	14	54		II Tr. c.	12	56		III Tr. f.	21	49
					I Tr. f.	15	41		III Tr. c.	13	52	29	IV E. c.	07	37 ⁷
6	I Sh. c.	10	42	14	III Sh. c.	06	19		III Sh. f.	13	55		I Sh. c.	10	53
	I Tr. c.	11	23		II Sh. c.	08	39		II Sh. f.	14	04		I Tr. p.	11	51
	I Sh. f.	13	00		III Tr. c.	09	31		I Em.	14	55		IV E. f.	12	17 ²
	I Tr. f.	13	41		I E. c.	09	51 ²		II Tr. f.	15	48		I Sh. f.	13	10
7	III Sh. c.	02	20		III Sh. f.	09	56		III Tr. f.	17	30		I Tr. f.	14	09
	III Tr. c.	05	07		II Tr. c.	10	12	22	I Sh. c.	08	59		IV Im.	17	01
	III Sh. f.	05	57		II Sh. f.	11	30		I Tr. c.	09	52		IV Em.	21	50
	II Sh. c.	06	06		I Em.	12	56		I Sh. f.	11	16	30	I E. c.	08	06 ¹
	II Tr. c.	07	27		II Tr. f.	13	04		I Tr. f.	12	10		II E. c.	08	23 ³
	I E. c.	07	57 ⁸		III Tr. f.	13	09						I Em.	11	23
	III Tr. f.	08	46	15	I Sh. c.	07	05	23	II E. c.	05	47 ¹		II Em.	13	21
	II Sh. f.	08	57		I Tr. c.	07	53		I E. c.	06	12 ⁹				
	II Tr. f.	10	19		I Sh. f.	09	22		I Em.	09	24				
	I Em.	10	57		I Tr. f.	10	11		II Em.	10	34				
8	I Sh. c.	05	10	16	II E. c.	03	10 ⁶	24	I Sh. c.	03	27				
	I Tr. c.	05	53		I E. c.	04	19 ⁶		I Tr. c.	04	22				
	I Sh. f.	07	28		I Em.	07	26		I Sh. f.	05	45				
	I Tr. f.	08	11		II Em.	07	47		I Tr. f.	06	40				

I.	II.	III.	IV.
Sept. 2, $\alpha_1 = -1^{\circ}5$; $\gamma_1 = 0^{\circ}0$	Sept. 1, $\alpha_1 = -1^{\circ}8$; $\gamma_1 = 0^{\circ}0$	Sept. 17, $\alpha_1 = -2^{\circ}8$; $\gamma_1 = +0^{\circ}1$	Sept. 12, $\alpha_1 = -3^{\circ}9$; $\gamma_1 = +0^{\circ}3$
Sept. 16, $\alpha_1 = -1^{\circ}7$; $\gamma_1 = 0^{\circ}0$	Sept. 16, $\alpha_1 = -2^{\circ}1$; $\gamma_1 = 0^{\circ}0$		Sept. 12, $\alpha_2 = -2^{\circ}1$; $\gamma_2 = +0^{\circ}3$

Eclipse commences - - E. c.
 Eclipse finishes - - E. f.
 Occultation, immersion - Im.
 Occultation, emersion - Em.

Transit commences - - Tr. c.
 Transit finishes - - Tr. f.
 Shadow commences - - Sh. c.
 Shadow finishes - - Sh. f.


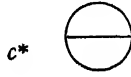

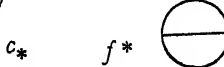
SATELLITES OF JUPITER, 1931.

611

SEPTEMBER.

Configurations at 04 ^h 00 ^m .			
Day.	West.		East.
1	3° 2	○	4° 1 ○
2	3	○ 2	4°
3	3 1°	○	2° 4°
4	2°	○ 4° 1	3
5	4° 1 2	○	3
6	4°	○ 1° 2 3°	
7	4°	1 3 ○ 2°	
8	4° 3° 2°	○ 1°	
9	1 4 3	○	2
10	4 3 1	○	2°
11	4 2°	○ 1 3	
12	3 1° 4	○	3
13		○ 4 1° 2 3°	
14		1 ○ 3° 2° 4	
15	3° 2°	○ 1°	4
16	2 3°	○ 1	4
17	1 ○ 3	○	2° 4
18		2° ○ 3 1	4°
19	2 1°	○	3 4°
20		○ 2 1 4° 3°	
21	1 4	○ 3° 2°	
22	4 3° 2 3°	○ 1°	
23	4° 3°	2 ○ 1	
24	4° 3	1 ○ 2	
25	2° ○ 3 4°	○ 1	
26	4 2 1°	○	3
27	4	○ 2 1 3°	
28	4 1°	○ 3° 2°	
29	2° 3° 4	○ 1°	
30	3° 2 1	○ 4	

PHASES OF THE ECLIPSES.

I		II	
III		IV	

OCTOBER.

Day		h m	Day		h m	Day		h m	Day		h m
1	I Sh. c	05 21	9	I E. c.	04 27.6	16	II Tr. f.	13 15	24	I Sh. f.	07 49
	I Tr. c.	06 21		II Sh. c.	05 36		III E. f.	15 39.5		I Tr. f.	09 00
	I Sh. f.	07 39		II Tr. c.	07 43		III Im.	16 39		IV Sh. c.	10 32
	I Tr. f.	08 39		I Em.	07 50		IV Em.	17 27		IV Sh. f.	15 08
				III E. c.	08 03.2		III Em.	20 19		IV Tr. c.	21 40
2	I E. c.	02 34.4		II Sh. f.	08 27	17	I Sh. c.	03 38	25	IV Tr. f.	02 25
	II Sh. c.	03 03		II Tr. f.	10 34		I Tr. c.	04 46		I E. c.	02 42.0
	III E. c.	04 05.1		III E. f.	11 41.8		I Sh. f.	05 55		II E. c.	05 29.5
	II Tr. c.	05 01		III Im.	12 27		I Tr. f.	07 04		I Em.	06 12
	I Em.	05 52		III Em.	16 06					II Em.	10 53
	II Sh. f.	05 54	10	I Sh. c.	01 44	18	I E. c.	00 48.9	26	I Sh. c.	00 00
	III E. f.	07 43.6		I Tr. c.	02 49		II E. c.	02 53.4		I Tr. c.	01 12
	II Tr. f.	07 52		I Sh. f.	04 01		I Em.	04 16		I Sh. f.	02 17
	III Im.	08 11		I Tr. f.	05 06		II Em.	08 11		I Tr. f.	03 29
	III Em.	11 51		I E. c.	22 55.8		I Sh. c.	22 06		I E. c.	21 10.2
	I Sh. c.	23 50					I Tr. c.	23 15		II Sh. c.	23 59
3	I Tr. c.	00 51	11	II E. c.	00 17.3	19	I Sh. f.	00 23	27	I Em.	00 40
	I Sh. f.	02 07		I Em.	02 19		I Tr. f.	01 33		II Tr. c.	02 24
	I Tr. f.	03 08		II Em.	05 28		I E. c.	19 17.2		II Sh. f.	02 50
	I E. c.	21 02.7		I Sh. c.	20 12		II Sh. c.	21 26		II Tr. f.	05 13
	II E. c.	21 41.0		I Tr. c.	21 18		I Em.	22 45		III Sh. c.	06 10
				I Sh. f.	22 30		II Tr. c.	23 44		III Sh. f.	09 47
				I Tr. f.	23 36					III Tr. c.	11 05
4	I Em.	00 22	12	I E. c.	17 24.1	20	II Sh. f.	00 17		III Tr. f.	14 42
	II Em.	02 43		II Sh. c.	18 53		III Sh. c.	02 12		I Sh. c.	18 28
	I Sh. c.	18 18		I Em.	20 48		II Tr. f.	02 34		I Tr. c.	19 41
	I Tr. c.	19 20		II Tr. c.	21 04		III Tr. c.	05 49		I Sh. f.	20 45
	I Sh. f.	20 36		II Sh. f.	21 43		III Tr. f.	10 34		I Tr. f.	21 58
	I Tr. f.	21 38		III Sh. c.	22 13		I Sh. c.	16 34			
5	I E. c.	15 31.0		II Tr. f.	23 54		I Tr. c.	17 45	28	I E. c.	15 38.5
	II Sh. c.	16 19	13	III Sh. f.	01 50		I Sh. f.	18 52		II E. c.	18 47.9
	III Sh. c.	18 15		III Tr. c.	02 43		I Tr. f.	20 02		I Em.	19 09
	II Tr. c.	18 22		III Tr. f.	06 21	21	I E. c.	13 45.5	29	II Em.	00 13
	I Em.	18 51		I Sh. c.	14 41		II E. c.	16 11.9		I Sh. c.	12 57
	II Sh. f.	19 10		I Tr. c.	15 47		I Em.	17 14		I Tr. c.	14 10
	II Tr. f.	21 13		I Sh. f.	16 58		II Em.	21 32		I Sh. f.	15 14
	III Sh. f.	21 52		I Tr. f.	18 05					I Tr. f.	16 27
	III Tr. c.	22 29									
6	III Tr. f.	02 07	14	I E. c.	11 52.4	22	I Sh. c.	11 03	30	I E. c.	10 06.8
	I Sh. c.	12 47		II E. c.	13 35.8		I Tr. c.	12 14		II Sh. c.	13 16
	I Tr. c.	13 50		I Em.	15 17		I Sh. f.	13 20		I Em.	13 38
	I Sh. f.	15 04		II Em.	18 50		I Tr. f.	14 31		II Tr. c.	15 42
	I Tr. f.	16 07								II Sh. f.	16 06
7	I E. c.	09 59.3	15	I Sh. c.	09 09	23	I E. c.	08 13.7		II Tr. f.	18 31
	II E. c.	10 59.6		I Tr. c.	10 17		II Sh. c.	10 42		III E. c.	19 55.7
	I Em.	13 20		I Sh. f.	11 27		I Em.	11 43		III E. f.	23 34.7
	II Em.	16 06		I Tr. f.	12 34		II Tr. c.	13 04			
	IV Sh. c.	16 35	16	IV E. c.	01 37.4		II Sh. f.	13 33			
	IV Sh. f.	21 08		IV E. f.	06 19.8		II Tr. f.	15 54			
				I E. c.	06 20.7		III E. c.	15 58.0			
				II Sh. c.	08 09		III E. f.	19 36.9			
				I Em.	09 46		III Im.	20 49	31	III Im.	00 56
				II Tr. c.	10 24					III Em.	04 36
				II Sh. f.	11 00					I Sh. c.	07 25
				III E. c.	12 00.7	24	III Em.	00 29		I Tr. c.	08 39
				IV Im.	12 35		I Sh. c.	05 31		I Sh. f.	09 42
							I Tr. c.	06 43		I Tr. f.	10 55

I.
Oct. 2, $\alpha_1 = -1.9$; $\gamma_1 = 0.0$
Oct. 16, $\alpha_1 = -2.0$; $\gamma_1 = 0.0$

II.
Oct. 3, $\alpha_1 = -2.4$; $\gamma_1 = 0.0$
Oct. 18, $\alpha_1 = -2.6$; $\gamma_1 = 0.0$

III.
Oct. 16, $\alpha_1 = -3.5$; $\gamma_1 = 0.0$
Oct. 16, $\alpha_2 = -1.5$; $\gamma_2 = 0.0$

IV.
Oct. 16, $\alpha_1 = -5.4$; $\gamma_1 = +0.1$
Oct. 16, $\alpha_2 = -3.5$; $\gamma_2 = +0.1$

Eclipse commences - - E. c.
Eclipse finishes - - E. f.
Occultation, immersion - Im.
Occultation, emersion - Em.

Transit commences - - Tr. c.
Transit finishes - - Tr. f.
Shadow commences - - Sh. c.
Shadow finishes - - Sh. f.

SATELLITES OF JUPITER, 1931.

613

OCTOBER.

Configurations at 03^h 30^m.

Day.	West.	East.
I	'3	○ I' '2 '4
2	● I	'3 2 ○ '4
3	2' I' ○	'3 '4
4	○ '2 '1	'3 '4
5	I' ○	2' 3' '4
6	2' 3' ○	'1 '4
7	3' '2 '1 ○	'4
8	'3	○ I' '2 4 ○
9	4' '3 '1 ○ 2'	.
10	4' 2' ○	'3 . I ○
11	● 2 4'	○ '1 '3
12	4' I' ○	2' 3'
13	'4 2' ○	'1 3 ○
14	'4 3' '2 I' ○	
15	'3 '4	○ I' '2
16	● 4 '3 '1 ○ 2'	
17	'2 I' ○ '3 '4	
18	● 2	○ '3 '4 ● '1
19	I' ○	'2 3' '4
20	2' ○ 3' '1	'4
21	3' '2 I' ○	'4
22	3' ○	'2 I' '4
23	'3 '1 ○	2' '4
24	2' ○ '3 I' '4	
25	● I '4 '2 ○	'3
26	4' I' ○	'2 3'
27	4' ○	'1 3' 2 ○
28	4' '2 3' I' ○	
29	4' 3' . ○	'2 '1
30	'4 '3 '1 ○	2'
31	'4 2' ○	I' ● '3

PHASES OF THE ECLIPSES.

I

c*



II

c*



III

c*

f*



IV

c*

f*



SATELLITES OF JUPITER, 1931.

NOVEMBER.

Day	I	h m	Day	II	h m	Day	III	h m	Day	IV	h m
1	I E. c.	04 35 ⁰	8	II E. c.	10 41 ²	16	I Sh. c.	05 41	23	I Sh. f.	09 51
	II E. c.	08 05 ⁴		II Em.	16 10		I Tr. c.	06 56		I Tr. f.	11 05
	I Em.	08 07					I Sh. f.	07 58			
	II Em.	13 32		I Sh. c.	03 47		I Tr. f.	09 13		I E. c.	04 42 ⁴
	IV E. c.	19 37 ¹	9	I Tr. c.	05 02				24	I Em.	08 15
2	IV E. f.	00 22 ³		I Sh. f.	06 04	17	I E. c.	02 49 ³		II Sh. c.	10 12
	I Sh. c.	01 54		I Tr. f.	07 19		I Em.	06 23		II Tr. c.	12 40
	I Tr. c.	03 08					II Sh. c.	07 40		II Sh. f.	13 03
	I Sh. f.	04 11	10	I E. c.	00 56 ³		II Tr. c.	10 09		II Tr. f.	15 30
	I Tr. f.	05 25		I Em.	04 29		II Sh. f.	10 30		III Sh. c.	22 02
	IV Im.	07 32		IV Sh. c.	04 29		II Tr. f.	12 58			
	IV Em.	12 25		II Sh. c.	05 06		III Sh. c.	18 04			
	I E. c.	23 03 ³		II Tr. c.	07 36		III Sh. f.	21 41	25	III Sh. f.	01 39
				II Sh. f.	07 56		III Tr. c.	23 10		I Sh. c.	02 03
3	II Sh. c.	02 32		IV Sh. f.	09 07					III Tr. c.	03 04
	I Em.	02 35		II Tr. f.	10 25	18	I Sh. c.	00 09		I Tr. c.	03 16
	II Tr. c.	05 01		III Sh. c.	14 07		I Tr. c.	01 24		I Sh. f.	04 20
	II Sh. f.	05 23		IV Tr. c.	16 11		I Sh. f.	02 26		I Tr. f.	05 33
	II Tr. f.	07 50		III Sh. f.	17 43		III Tr. f.	02 46		III Tr. f.	06 40
	III Sh. c.	10 08		III Tr. c.	19 12		I Tr. f.	03 41		I E. c.	23 10 ⁷
	III Sh. f.	13 45		IV Tr. f.	20 57		IV E. c.	13 36 ²	26	I Em.	02 43
	III Tr. c.	15 11		I Sh. c.	22 16		IV E. f.	18 23 ⁷		II E. c.	05 10 ⁷
	III Tr. f.	18 48		III Tr. f.	22 49		I E. c.	21 17 ⁶		II Em.	10 36
	I Sh. c.	20 22		I Tr. c.	23 31					I Sh. c.	20 31
	I Tr. c.	21 36	11	I Sh. f.	00 33	19	I Em.	00 51		I Tr. c.	21 44
	I Sh. f.	22 39		I Tr. f.	01 48		IV Im.	01 41		IV Sh. c.	22 26
	I Tr. f.	23 53		I E. c.	19 24 ⁶		II E. c.	02 35 ²		I Sh. f.	22 48
				I Em.	22 58		IV Em.	06 35	27	I Tr. f.	00 01
4	I E. c.	17 31 ⁶		II E. c.	23 59 ⁵		II Em.	08 04		IV Sh. f.	03 06
	I Em.	21 04					I Sh. c.	18 38		IV Tr. c.	09 52
	II E. c.	21 23 ⁷	12	II Em.	05 29		I Tr. c.	19 52		IV Tr. f.	14 38
5	II Em.	02 52		I Sh. c.	16 44		I Sh. f.	20 55		I E. c.	17 39 ⁰
	I Sh. c.	14 50		I Tr. c.	17 59	20	I Tr. f.	22 09		I Em.	21 10
	I Tr. c.	16 05		I Sh. f.	19 01					II Sh. c.	23 29
	I Sh. f.	17 07		I Tr. f.	20 16		I E. c.	15 45 ⁹			
	I Tr. f.	18 22	13	I E. c.	13 52 ⁸		I Em.	19 19	28	II Tr. c.	01 55
6	I E. c.	11 59 ⁸		I Em.	17 26		II Sh. c.	20 55		II Sh. f.	02 20
	I Em.	15 32		II Sh. c.	18 22		II Tr. c.	23 24		II Tr. f.	04 45
	II Sh. c.	15 49		II Tr. c.	20 53	21	II Sh. f.	23 47		III E. c.	11 48 ⁰
	II Tr. c.	18 18		II Sh. f.	21 13					I Sh. c.	14 59
	II Sh. f.	18 40		II Tr. f.	23 42		II Tr. f.	02 14		III E. f.	15 27 ⁴
	II Tr. f.	21 08					III E. c.	07 49 ⁹		I Tr. c.	16 12
	III E. c.	23 53 ⁵	14	III E. c.	03 52 ⁰		III E. f.	11 29 ⁴		III Im.	16 47
7	III E. f.	03 32 ⁷		III E. f.	07 31 ³		III Im.	12 56		I Sh. f.	17 16
	III Im.	05 00		III Im.	09 00		I Sh. c.	13 06		I Tr. f.	18 29
	III Em.	08 39		I Sh. c.	11 12		I Tr. c.	14 20		III Em.	20 25
	I Sh. c.	09 19		I Tr. c.	12 28		I Sh. f.	15 23	29	I E. c.	12 07 ²
	I Tr. c.	10 34		III Em.	12 39		I Tr. f.	16 37		I Em.	15 38
	I Sh. f.	11 36		I Sh. f.	13 29	22	I E. c.	10 14 ¹		II E. c.	18 28 ¹
	I Tr. f.	12 51	15	I Tr. f.	14 45		II E. c.	15 52 ⁶		II Em.	23 51
				I E. c.	08 21 ¹		II Em.	21 20	30	I Sh. c.	09 28
8	I E. c.	06 28 ¹		I Em.	11 54					I Tr. c.	10 40
	I Em.	10 01		II E. c.	13 17 ⁰	23	I Sh. c.	07 34		I Sh. f.	11 45
				II Em.	18 46		I Tr. c.	08 48		I Tr. f.	12 57
I.			II.			III.			IV.		
Nov. 1, $x_1 = -2.1$; $y_1 = 0.0$			Nov. 1, $x_1 = -2.7$; $y_1 = -0.1$			Nov. 14, $x_1 = -3.8$; $y_1 = -0.1$			Nov. 18, $x_1 = -5.8$; $y_1 = 0.0$		
Nov. 15, $x_1 = -2.1$; $y_1 = 0.0$			Nov. 15, $x_1 = -2.7$; $y_1 = -0.1$			Nov. 14, $x_2 = -1.8$; $y_2 = -0.1$			Nov. 18, $x_2 = -3.9$; $y_2 = 0.0$		

Eclipse commences	-	-	E. c.
Eclipse finishes	-	-	E. f.
Occultation, immersion	-		Im.
Occultation, emersion	-		Em.

Transit commences	-	-	Tr. c.
Transit finishes	-	-	Tr. f.
Shadow commences	-	-	Sh. c.
Shadow finishes	-	-	Sh. f.





SATELLITES OF JUPITER, 1931.

615

NOVEMBER.

Configurations at 03 ^h 00 ^m .			
Day.	West.		East.
1	4	2 1	3
2		4 1	2 3
3		1 2	3 4
4	2 3 1		4
5	3	2 1	4
6	3 1		2 4
7	● 1	2	1 4
8		2 1	3 4
9		1 2	3 4
10	● 1		2 4 3
11		2 4 3 1	
12	● 2	4 3	1
13		4 3 1	2
14	4	3 2	1
15	4	2 1	3
16	4		1 2 3
17	● 1	4	2 3
18	1 ○	4 2	3
19	● 2 ● 1	3	1
20		3 1	2 4
21		3 2	1 4
22		2 1	3 4
23			2 1 3 4
24		1	2 3 4
25		2 3 1	4
26		3 2 1	4
27		3 1	4 2
28		3 4	1 2 ○
29	4	2 1	3
30	4		2 1 3

PHASES OF THE ECLIPSES.

I		II	
III		IV	

DECEMBER.

Day		h	m	Day		h	m	Day		h	m	Day		h	m
1	I E. c.	00	35.5	9	I Sh. c.	05	50	16	III Tr. c.	14	17	24	II Em.	20	22
	I Em.	10	06		III Sh. c.	05	59		III Tr. f.	17	53				
	II Sh. c.	12	46		I Tr. c.	06	58					25	I Sh. c.	04	05
	II Tr. c.	15	09		I Sh. f.	08	07	17	I E. c.	04	50.2		I Tr. c.	05	02
	II Sh. f.	15	37		I Tr. f.	09	15		I Em.	08	12		I Sh. f.	06	22
	II Tr. f.	18	00		III Sh. f.	09	36		II E. c.	12	56.8		I Tr. f.	07	19
					III Tr. c.	10	37		II Em.	17	59				
2	III Sh. c.	02	00		III Tr. f.	14	13					26	I E. c.	01	11.8
	I Sh. c.	03	56					18	I Sh. c.	02	11		I Em.	04	26
	I Tr. c.	05	08	10	I E. c.	02	57.0		I Tr. c.	03	14		II Sh. c.	09	44
	III Sh. f.	05	37		I Em.	06	23		I Sh. f.	04	29		II Tr. c.	11	36
	I Sh. f.	06	13		II E. c.	10	21.5		I Tr. f.	05	31		II Sh. f.	12	36
	III Tr. c.	06	52		II Em.	15	34		I E. c.	23	18.5		II Tr. f.	14	27
	I Tr. f.	07	25	11	I Sh. c.	00	18	19	I Em.	02	39		I Sh. c.	22	33
	III Tr. f.	10	28		I Tr. c.	01	25		II Sh. c.	07	10		I Tr. c.	23	28
3	I E. c.	01	03.8		I Sh. f.	02	35		II Tr. c.	09	14	27	I Sh. f.	00	51
	I Em.	04	33		I Tr. f.	03	42		II Sh. f.	10	01		I Tr. f.	01	46
	II E. c.	07	46.2		I E. c.	21	25.2		II Tr. f.	12	04		III E. c.	03	38.6
	II Em.	13	06						I Sh. c.	20	40		III E. f.	07	18.2
	I Sh. c.	22	24	12	I Em.	00	51		I Tr. c.	21	41		III Im.	07	24
	I Tr. c.	23	35		II Sh. c.	04	36		I Sh. f.	22	57		III Em.	11	02
4	I Sh. f.	00	42		II Tr. c.	06	49		III E. c.	23	40.6		I E. c.	19	40.2
	I Tr. f.	01	52		II Sh. f.	07	27		I Tr. f.	23	58		I Em.	22	53
	I E. c.	19	32.1		II Tr. f.	09	40					28	II E. c.	04	49.2
	I Em.	23	01		I Sh. c.	18	46		III E. f.	03	20.1		II Em.	09	32
5	II Sh. c.	02	02		III E. c.	19	42.8	20	III Im.	03	52		I Sh. c.	17	02
	II Tr. c.	04	23		I Tr. c.	19	53		III Em.	07	29		I Tr. c.	17	55
	II Sh. f.	04	54		I Sh. f.	21	03		I E. c.	17	46.8		I Sh. f.	19	19
	II Tr. f.	07	14		I Tr. f.	22	10		I Em.	21	06		I Tr. f.	20	12
	IV E. c.	07	35.6	13	III E. f.	23	22.3	21	II E. c.	02	14.1				
	IV E. f.	12	25.0		III Im.	00	15		II Em.	07	10	29	I E. c.	14	08.5
	III E. c.	15	45.4		III Em.	03	53		I Sh. c.	15	08		I Em.	17	20
	I Sh. c.	16	53		I E. c.	15	53.6		I Tr. c.	16	08		II Sh. c.	23	01
	I Tr. c.	18	03		IV Sh. c.	16	22		I Sh. f.	17	25				
	IV Im.	18	55		I Em.	19	18		I Tr. f.	18	25	30	II Tr. c.	00	46
	I Sh. f.	19	10		IV Sh. f.	21	05						II Sh. f.	01	53
	III E. f.	19	24.9		II E. c.	23	38.9	22	IV E. c.	01	35.4		II Tr. f.	03	37
	I Tr. f.	20	20						IV E. f.	06	26.4		IV Sh. c.	10	18
	III Im.	20	33	14	IV Tr. c.	02	36		IV Im.	11	09		I Sh. c.	11	30
	IV Em.	23	48		II Em.	04	46		I E. c.	12	15.4		I Tr. c.	12	22
6	III Em.	00	11		IV Tr. f.	07	21		I Em.	15	33		I Sh. f.	13	47
	I E. c.	14	00.4		I Sh. c.	13	15		IV Em.	16	01		I Tr. f.	14	39
	I Em.	17	28		I Tr. c.	14	20		II Sh. c.	20	27		IV Sh. f.	15	03
	II E. c.	21	03.5		I Sh. f.	15	32		II Tr. c.	22	25		III Sh. c.	17	52
				15	I Tr. f.	16	37		II Sh. f.	23	19		IV Tr. c.	18	21
7	II Em.	02	20		I E. c.	10	21.9	23	II Tr. f.	01	16		III Tr. c.	21	22
	I Sh. c.	11	21		I Em.	13	45		I Sh. c.	09	36		III Sh. f.	21	30
	I Tr. c.	12	30		II Sh. c.	17	53		I Tr. c.	10	35		IV Tr. f.	23	06
	I Sh. f.	13	38		II Tr. c.	20	02		I Sh. f.	11	54	31	III Tr. f.	00	58
	I Tr. f.	14	47		II Sh. f.	20	45		I Tr. f.	12	52		I E. c.	08	37.0
					II Tr. f.	22	53		III Sh. c.	13	54		I Em.	11	46
8	I E. c.	08	28.6	16	I Sh. c.	07	43		III Sh. f.	17	32		II E. c.	18	07.0
	I Em.	11	56		I Tr. c.	08	47		III Tr. c.	17	52		II Em.	22	42
	II Sh. c.	15	19		III Sh. c.	09	56	24	III Tr. f.	21	28				
	II Tr. c.	17	36		I Sh. f.	10	00		I E. c.	06	43.5	32	I Sh. c.	05	58
	II Sh. f.	18	11		I Tr. f.	11	04		I Em.	10	00		I Tr. c.	06	48
	II Tr. f.	20	27		III Sh. f.	13	34		II E. c.	15	31.9		I Sh. f.	08	16
													I Tr. f.	09	05

I.	II.	III.	IV.
Dec. 1, $\alpha_1 = -2.0$; $\gamma_1 = 0.0$	Dec. 3, $\alpha_1 = -2.6$; $\gamma_1 = -0.1$	Dec. 19, $\alpha_1 = -3.3$; $\gamma_1 = -0.1$	Dec. 22, $\alpha_1 = -4.9$; $\gamma_1 = 0.0$
Dec. 17, $\alpha_1 = -1.9$; $\gamma_1 = 0.0$	Dec. 17, $\alpha_1 = -2.4$; $\gamma_1 = -0.1$	Dec. 20, $\alpha_2 = -1.3$; $\gamma_2 = -0.1$	Dec. 22, $\alpha_2 = -2.9$; $\gamma_2 = 0.0$

Eclipse commences - - E. c.
 Eclipse finishes - - E. f.
 Occultation, immersion - Im.
 Occultation, emersion - Em.

Transit commences - - Tr. c.
 Transit finishes - - Tr. f.
 Shadow commences - - Sh. c.
 Shadow finishes - - Sh. f.

SATELLITES OF JUPITER, 1931.

617

DECEMBER.

Configurations at 02^h 30^m.

Day.	West.		East.	
I	4°	1°	2°	3°
2	4°	2°	1°	3°
3	1°	4°	3°	2°
4	4°	1°	2°	
5		3°	4°	1°
6		2°	1°	3°
7			2°	1°
8		1°	2°	3°
9		2°	1°	3°
10		3°	1°	4°
11		3°	2°	4°
12		3°	1°	4°
13		2°	1°	4°
14	2°	4°	1°	3°
15		4°	1°	2°
16		4°	2°	1°
17		4°	2°	1°
18		4°	3°	1°
19		4°	3°	1°
20	3°	4°	2°	1°
21	2°	4°	1°	3°
22	4°	1°	2°	3°
23		2°	1°	3°
24		2°	1°	3°
25		3°	1°	2°
26	1°	3°	2°	4°
27		2°	3°	1°
28		2°	1°	3°
29		1°	2°	3°
30	2°		1°	3°
31		2°	1°	3°
32		3°	1°	2°

PHASES OF THE ECLIPSES.

I

C*



II

C*



III

C*

f*



IV

C*

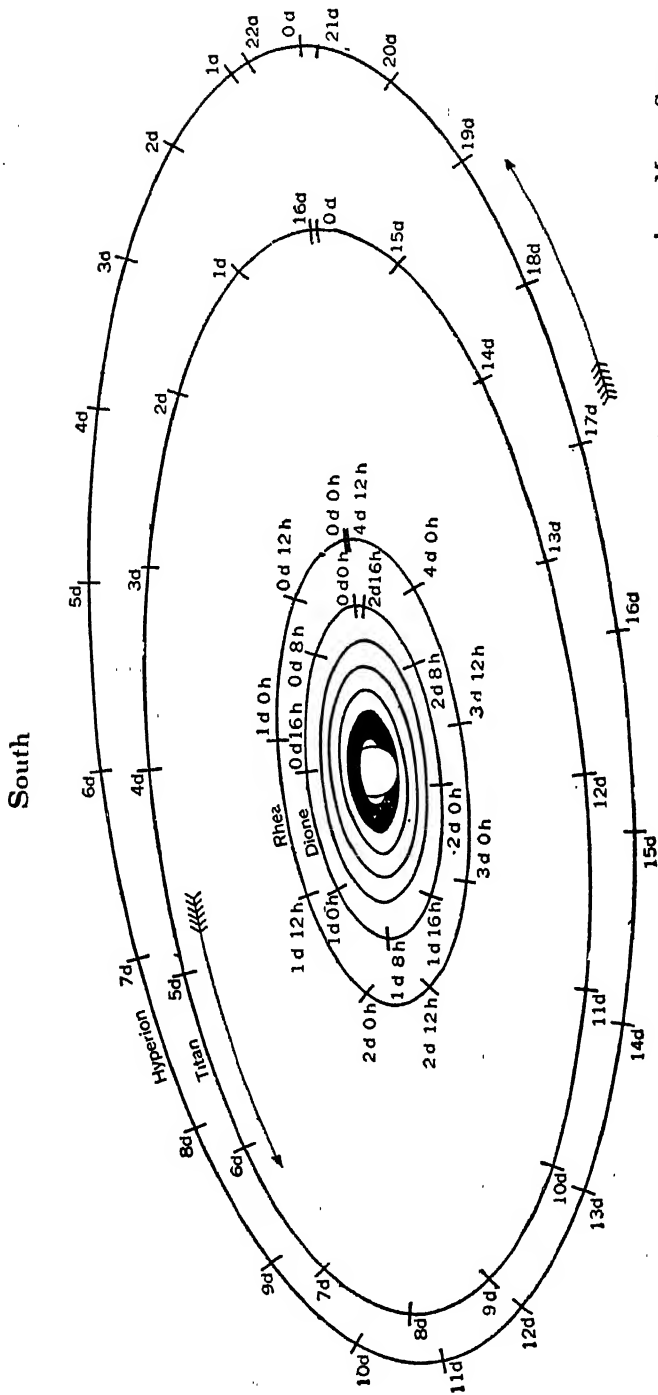
f*



RINGS OF SATURN, 1931.

ELEMENTS FOR DETERMINING THE GEOCENTRIC POSITION,
APPEARANCE, AND MAGNITUDE OF SATURN'S RINGS.

Date.	<i>a</i>	<i>b</i>	<i>P</i>	<i>B</i>	<i>U</i>	ω	<i>B'</i>	<i>U'</i>	Stellar Mag. of Saturn.
Jan. 1	34°08	+14°33	+6°54'1	+24°52'4	159°57'8	41°59'4	+24°45'1	118°23'7	+0.7
9	34°08	14°22	6°56'4	24°40'3	160°58'8	41°59'4	24°42'4	118°39'4	0.7
17	34°13	14°13	6°58'6	24°27'7	161°59'4	41°59'3	24°39'7	118°55'0	0.7
25	34°23	14°05	7°00'6	24°14'8	162°58'9	41°59'3	24°37'0	119°10'7	0.7
Feb. 2	34°38	14°00	7°02'4	24°01'9	163°56'6	41°59'3	24°34'3	119°26'3	0.8
10	34°58	+13°96	+7°04'0	+23°49'2	164°52'1	41°59'2	+24°31'5	119°41'9	+0.8
18	34°83	13°95	7°05'3	23°36'8	165°44'6	41°59'2	24°28'7	119°57'6	0.8
26	35°12	13°96	7°06'5	23°24'9	166°33'6	41°59'2	24°25'9	120°13'2	0.8
Mar. 6	35°47	13°99	7°07'6	23°13'7	167°18'6	41°59'1	24°23'1	120°28'8	0.8
14	35°86	14°04	7°08'4	23°03'5	167°59'1	41°59'1	24°20'2	120°44'4	0.8
22	36°27	+14°12	+7°09'1	+22°54'5	168°34'6	41°59'0	+24°17'3	120°59'9	+0.8
30	36°72	14°22	7°09'6	22°46'7	169°04'6	41°59'0	24°14'4	121°15'5	0.8
Apr. 7	37°20	14°34	7°10'0	22°40'5	169°28'9	41°59'0	24°11'5	121°31'1	0.8
15	37°70	14°48	7°10'3	22°35'9	169°47'1	41°58'9	24°08'5	121°46'6	0.8
23	38°21	14°65	7°10'5	22°33'0	169°59'0	41°58'9	24°05'5	122°02'2	0.7
May 1	38°72	+14°84	+7°10'6	+22°32'0	170°04'3	41°58'9	+24°02'5	122°17'7	+0.7
9	39°23	15°04	7°10'6	22°32'8	170°03'2	41°58'8	23°59'5	122°33'2	0.6
17	39°72	15°26	7°10'5	22°35'3	169°55'7	41°58'8	23°56'3	122°48'8	0.6
25	40°18	15°48	7°10'3	22°39'7	169°42'1	41°58'7	23°53'2	123°04'3	0.6
June 2	40°60	15°71	7°10'0	22°45'7	169°22'6	41°58'7	23°50'1	123°19'8	0.5
10	40°96	+15°93	+7°09'7	+22°53'0	168°58'0	41°58'7	+23°47'0	123°35'2	+0.4
18	41°26	16°14	7°09'2	23°01'5	168°28'9	41°58'6	23°43'8	123°50'7	0.4
26	41°49	16°33	7°08'6	23°10'9	167°56'1	41°58'6	23°40'6	124°06'2	0.4
July 4	41°64	16°50	7°07'9	23°20'8	167°20'8	41°58'6	23°37'3	124°21'6	0.3
12	41°70	16°63	7°07'1	23°31'1	166°44'0	41°58'5	23°34'1	124°37'0	0.3
20	41°67	+16°73	+7°06'3	+23°41'2	166°06'8	41°58'5	+23°30'8	124°52'5	+0.3
28	41°55	16°80	7°05'4	23°50'9	165°30'7	41°58'4	23°27'5	125°07'9	0.3
Aug. 5	41°35	16°83	7°04'6	23°59'9	164°56'6	41°58'4	23°24'2	125°23'3	0.4
13	41°08	16°80	7°03'7	24°08'1	164°25'7	41°58'4	23°20'8	125°38'7	0.4
21	40°74	16°73	7°03'0	24°15'2	163°59'0	41°58'3	23°17'5	125°54'1	0.4
29	40°34	+16°63	+7°02'4	+24°21'0	163°37'4	41°58'3	+23°14'0	126°09'5	+0.5
Sept. 6	39°89	16°50	7°01'9	24°25'4	163°21'5	41°58'2	23°10'6	126°24'8	0.5
14	39°41	16°33	7°01'7	24°28'3	163°11'9	41°58'2	23°07'1	126°40'2	0.6
22	38°91	16°13	7°01'6	24°29'8	163°08'8	41°58'2	23°03'6	126°55'5	0.6
30	38°40	15°92	7°01'7	24°29'6	163°12'5	41°58'1	23°00'1	127°10'9	0.6
Oct. 8	37°89	+15°69	+7°02'1	+24°27'9	163°22'9	41°58'1	+22°56'6	127°26'2	+0.7
16	37°39	15°45	7°02'6	24°24'6	163°40'0	41°58'1	22°53'0	127°41'5	0.7
24	36°91	15°21	7°03'4	24°19'7	164°03'4	41°58'0	22°49'4	127°56'8	0.7
Nov. 1	36°45	14°96	7°04'3	24°13'4	164°32'7	41°58'0	22°45'8	128°12'1	0.8
9	36°02	14°71	7°05'2	24°05'6	165°07'6	41°57'9	22°42'2	128°27'4	0.8
17	35°63	+14°46	+7°06'2	+23°56'4	165°47'6	41°57'9	+22°38'5	128°42'6	+0.8
25	35°28	14°22	7°07'3	23°45'8	166°32'1	41°57'9	22°34'7	128°57'9	0.8
Dec. 3	34°98	13°99	7°08'4	23°34'0	167°20'5	41°57'8	22°31'0	129°13'1	0.8
11	34°72	13°77	7°09'5	23°20'9	168°12'2	41°57'8	22°27'3	129°28'4	0.8
19	34°51	13°55	7°10'4	23°06'8	169°06'6	41°57'8	22°23'6	129°43'6	0.8
27	34°35	+13°35	+7°11'3	+22°51'8	170°03'0	41°57'7	+22°19'8	129°58'8	+0.8
35	34°24	+13°16	+7°12'1	+22°36'1	171°00'8	41°57'7	+22°16'0	130°14'0	+0.8



MEAN SYNODIC PERIODS.

	d	h
I.	0	22.6
II.	1	08.9
III.	1	21.3
IV.	2	17.7
V.	4	12.5
VI.	15	23.3
VII.	21	07.6
VIII.	79	22.1
IX.	523	15.6

North

APPARENT ORBITS OF THE SEVEN INNER SATELLITES OF SATURN
AT DATE OF OPPOSITION, 1931 JULY 13, AS SEEN IN AN INVERTING
TELESCOPE.

NAMES OF THE SATELLITES.

- I. Mimas
- II. Enceladus
- III. Tethys
- IV. Dione
- V. Rhea
- VI. Titan
- VII. Hyperion
- VIII. Japetus
- IX. Phoebe

SATELLITES OF SATURN, 1931.

MIMAS.

Greenwich Mean Time of Eastern Elongation.

	d h		d h		d h		d h		d h		d h
Mar.	28 06.3	May	7 18.9	June	17 07.4	July	27 19.8	Sept.	6 08.3	Oct.	16 21.0
	29 05.0		8 17.5		18 06.0		28 18.4		7 06.9		17 19.6
	30 03.6		9 16.1		19 04.6		29 17.0		8 05.5		18 18.2
	31 02.2		10 14.7		20 03.2		30 15.6		9 04.2		19 16.9
Apr.	1 00.8		11 13.3		21 01.8		31 14.2		10 02.8		20 15.5
	1 23.5		12 11.9		22 00.4	Aug.	1 12.8		11 01.4		21 14.1
	2 22.1		13 10.5		22 23.1		2 11.5		12 00.0		22 12.7
	3 20.7		14 09.2		23 21.7		3 10.1		12 22.7		23 11.4
	4 19.3		15 07.8		24 20.3		4 08.7		13 21.3		24 10.0
	5 18.0		16 06.4		25 18.9		5 07.3		14 19.9		25 08.6
	6 16.6		17 05.0		26 17.5		6 06.0		15 18.5		26 07.2
	7 15.2		18 03.7		27 16.1		7 04.6		16 17.1		27 05.9
	8 13.8		19 02.3		28 14.7		8 03.2		17 15.7		28 04.5
	9 12.4		20 00.9		29 13.3		9 01.8		18 14.3		29 03.1
	10 11.0		20 23.5		30 11.9		10 00.4		19 13.0		30 01.7
	11 09.6		21 22.1	July	1 10.6		10 23.1		20 11.6		31 00.4
	12 08.3		22 20.8		2 09.2		11 21.7		21 10.2		31 23.0
	13 06.9		23 19.4		3 07.8		12 20.3		22 08.8	Nov.	1 21.6
	14 05.5		24 18.0		4 06.4		13 18.9		23 07.5		2 20.2
	15 04.1		25 16.6		5 05.0		14 17.5		24 06.1		3 18.8
	16 02.8		26 15.2		6 03.6		15 16.1		25 04.7		4 17.5
	17 01.4		27 13.8		7 02.2		16 14.7		26 03.3		5 16.1
	18 00.0		28 12.4		8 00.8		17 13.3		27 01.9		6 14.7
	18 22.6		29 11.0		8 23.5		18 12.0		28 00.6		7 13.3
	19 21.2		30 09.7		9 22.1		19 10.6		28 23.2		8 12.0
	20 19.9		31 08.3		10 20.7		20 09.2		29 21.8		9 10.6
	21 18.5	June	1 06.9		11 19.3		21 07.8		30 20.4		10 09.2
	22 17.1		2 05.5		12 17.9		22 06.4	Oct.	1 19.0		11 07.8
	23 15.7		3 04.2		13 16.5		23 05.0		2 17.6		12 06.5
	24 14.3		4 02.8		14 15.1		24 03.6		3 16.3		13 05.1
	25 12.9		5 01.4		15 13.7		25 02.2		4 14.9		14 03.7
	26 11.5		6 00.0		16 12.3		26 00.9		5 13.5		15 02.3
	27 10.1		6 22.6		17 11.0		26 23.5		6 12.1		16 01.0
	28 08.8		7 21.3		18 09.6		27 22.1		7 10.8		16 23.6
	29 07.4		8 19.9		19 08.2		28 20.7		8 09.4		17 22.2
	30 06.0		9 18.5		20 06.8		29 19.3		9 08.0		
May	1 04.6		10 17.1		21 05.5		30 17.9		10 06.6		
	2 03.2		11 15.7		22 04.1		31 16.5		11 05.3		
	3 01.8		12 14.3		23 02.7	Sept.	1 15.2		12 03.9		
	4 00.4		13 12.9		24 01.3		2 13.8		13 02.5		
	4 23.0		14 11.5		24 23.9		3 12.4		14 01.1		
	5 21.7		15 10.2		25 22.6		4 11.0		14 23.8		
	6 20.3		16 08.8		26 21.2		5 09.7		15 22.4		

SATELLITES OF SATURN, 1931.

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ENCELADUS.

Greenwich Mean Time of Eastern Elongation.

Mar.	d h	May	d h	June	d h	July	d h	Sept.	d h	Oct.	d h
	28 17.9		7 11.5		16 05.0		25 22.3		3 15.9		13 09.7
	30 02.8		8 20.4		17 13.9		27 07.2		5 00.8		14 18.6
	31 11.6		10 05.3		18 22.7		28 16.1		6 09.7		16 03.5
Apr.	1 20.5		11 14.2		20 07.6		30 01.0		7 18.6		17 12.4
	3 05.4		12 23.1		21 16.5		31 09.9		9 03.5		18 21.3
	4 14.3		14 07.9		23 01.4	Aug.	1 18.8		10 12.4		20 06.2
	5 23.2		15 16.8		24 10.2		3 03.6		11 21.2		21 15.1
	7 08.1		17 01.7		25 19.1		4 12.5		13 06.1		23 00.0
	8 17.0		18 10.6		27 04.0		5 21.4		14 15.0		24 08.9
	10 01.9		19 19.5		28 12.9		7 06.3		15 23.9		25 17.7
	11 10.8		21 04.4		29 21.7		8 15.2		17 08.8		27 02.6
	12 19.6		22 13.2	July	1 06.6		10 00.1		18 17.7		28 11.5
	14 04.5		23 22.1		2 15.5		11 08.9		20 02.5		29 20.4
	15 13.4		25 07.0		4 00.4		12 17.8		21 11.4		31 05.3
	16 22.3		26 15.9		5 09.2		14 02.7		22 20.3	Nov.	1 14.2
	18 07.2		28 00.7		6 18.1		15 11.6		24 05.2		2 23.1
	19 16.1		29 09.6		8 03.0		16 20.5		25 14.1		4 08.0
	21 00.9		30 18.5		9 11.9		18 05.3		26 23.0		5 16.9
	22 09.8	June	1 03.4		10 20.7		19 14.2		28 07.8		7 01.8
	23 18.7		2 12.2		12 05.6		20 23.1		29 16.7		8 10.7
	25 03.6		3 21.1		13 14.5		22 08.0	Oct.	1 01.6		9 19.6
	26 12.5		5 06.0		14 23.3		23 16.9		2 10.5		11 04.5
	27 21.4		6 14.9		16 08.2		25 01.8		3 19.4		12 13.4
	29 06.2		7 23.7		17 17.1		26 10.6		5 04.3		13 22.3
	30 15.1		9 08.6		19 02.0		27 19.5		6 13.2		15 07.2
May	2 00.0		10 17.5		20 10.8		29 04.4		7 22.1		16 16.1
	3 08.9		12 02.4		21 19.7		30 13.3		9 07.0		18 01.0
	4 17.8		13 11.2		23 04.6		31 22.2		10 15.9		
	6 02.7		14 20.1		24 13.5	Sept.	2 07.1		12 00.8		

TETHYS.

Greenwich Mean Time of Eastern Elongation.

Mar.	d h	May	d h	June	d h	July	d h	Sept.	d h	Oct.	d h
	29 14.4		8 05.9		16 21.1		26 12.1		4 03.3		13 18.9
	31 11.7		10 03.2		18 18.4		28 09.4		6 00.6		15 16.2
Apr.	2 09.0		12 00.5		20 15.6		30 06.7		7 22.0		17 13.5
	4 06.3		13 21.8		22 12.9	Aug.	1 04.0		9 19.3		19 10.8
	6 03.7		15 19.1		24 10.2		3 01.3		11 16.6		21 08.2
	8 01.0		17 16.4		26 07.5		4 22.6		13 13.9		23 05.5
	9 22.3		19 13.6		28 04.8		6 19.9		15 11.2		25 02.8
	11 19.6		21 10.9		30 02.1		8 17.2		17 08.5		27 00.1
	13 16.9		23 08.2	July	1 23.4		10 14.5		19 05.8		28 21.4
	15 14.2		25 05.5		3 20.7		12 11.8		21 03.1		30 18.8
	17 11.5		27 02.8		5 17.9		14 09.1		23 00.4	Nov.	1 16.1
	19 08.8		29 00.1		7 15.2		16 06.4		24 21.8		3 13.4
	21 06.1		30 21.4		9 12.5		18 03.7		26 19.1		5 10.8
	23 03.4	June	1 18.7		11 09.8		20 01.0		28 16.4		7 08.1
	25 00.7		3 16.0		13 07.1		21 22.3		30 13.7		9 05.4
	26 22.0		5 13.3		15 04.4		23 19.5	Oct.	2 11.0		11 02.8
	28 19.3		7 10.6		17 01.7		25 16.8		4 08.3		13 00.1
	30 16.6		9 07.9		18 23.0		27 14.1		6 05.6		14 21.4
May	2 14.0		11 05.2		20 20.3		29 11.4		8 02.9		16 18.8
	4 11.3		13 02.5		22 17.5		31 08.7		10 00.3		18 16.1
	6 08.6		14 23.8		24 14.8	Sept.	2 06.0		11 21.6		

SATELLITES OF SATURN, 1931.

DIONE.

Greenwich Mean Time of Eastern Elongation.

Mar. 28 ^d 11 ^h ·8	May 8 ^d 13 ^h ·3	June 18 ^d 14 ^h ·2	July 29 ^d 14 ^h ·9	Sept. 8 ^d 15 ^h ·9	Oct. 19 ^d 17 ^h ·4
31 ^d 05 ^h ·5	11 ^d 07 ^h ·0	21 ^d 07 ^h ·9	Aug. 1 ^d 08 ^h ·6	11 ^d 09 ^h ·6	22 ^d 11 ^h ·1
Apr. 2 ^d 23 ^h ·3	14 ^d 00 ^h ·7	24 ^d 01 ^h ·5	4 ^d 02 ^h ·3	14 ^d 03 ^h ·3	25 ^d 04 ^h ·8
5 ^d 17 ^h ·0	16 ^d 18 ^h ·4	26 ^d 19 ^h ·2	6 ^d 19 ^h ·9	16 ^d 21 ^h ·0	27 ^d 22 ^h ·6
8 ^d 10 ^h ·7	19 ^d 12 ^h ·0	29 ^d 12 ^h ·8	9 ^d 13 ^h ·6	19 ^d 14 ^h ·7	30 ^d 16 ^h ·3
11 ^d 04 ^h ·4	22 ^d 05 ^h ·7	July 2 ^d 06 ^h ·5	12 ^d 07 ^h ·2	22 ^d 08 ^h ·4	Nov. 2 ^d 10 ^h ·0
13 ^d 22 ^h ·1	24 ^d 23 ^h ·3	5 ^d 00 ^h ·1	15 ^d 00 ^h ·9	25 ^d 02 ^h ·0	5 ^d 03 ^h ·7
16 ^d 15 ^h ·8	27 ^d 17 ^h ·0	7 ^d 17 ^h ·8	17 ^d 18 ^h ·6	27 ^d 19 ^h ·7	7 ^d 21 ^h ·4
19 ^d 09 ^h ·5	30 ^d 10 ^h ·7	10 ^d 11 ^h ·4	20 ^d 12 ^h ·3	30 ^d 13 ^h ·4	10 ^d 15 ^h ·1
22 ^d 03 ^h ·2	June 2 ^d 04 ^h ·3	13 ^d 05 ^h ·1	23 ^d 05 ^h ·9	Oct. 3 ^d 07 ^h ·1	13 ^d 08 ^h ·9
24 ^d 20 ^h ·9	4 ^d 22 ^h ·0	15 ^d 22 ^h ·7	25 ^d 23 ^h ·6	6 ^d 00 ^h ·8	16 ^d 02 ^h ·6
27 ^d 14 ^h ·6	7 ^d 15 ^h ·6	18 ^d 16 ^h ·3	28 ^d 17 ^h ·2	8 ^d 18 ^h ·5	18 ^d 20 ^h ·3
30 ^d 08 ^h ·3	10 ^d 09 ^h ·3	21 ^d 10 ^h ·0	31 ^d 10 ^h ·9	11 ^d 12 ^h ·3	
May 3 ^d 02 ^h ·0	13 ^d 02 ^h ·9	24 ^d 03 ^h ·6	Sept. 3 ^d 04 ^h ·6	14 ^d 06 ^h ·0	
5 ^d 19 ^h ·6	15 ^d 20 ^h ·6	26 ^d 21 ^h ·3	5 ^d 22 ^h ·3	16 ^d 23 ^h ·7	

RHEA.

Greenwich Mean Time of Eastern Elongation.

Mar. 29 ^d 19 ^h ·5	May 9 ^d 11 ^h ·5	June 19 ^d 02 ^h ·8	July 29 ^d 17 ^h ·7	Sept. 8 ^d 08 ^h ·9	Oct. 19 ^d 00 ^h ·8
Apr. 3 ^d 08 ^h ·0	13 ^d 23 ^h ·9	23 ^d 15 ^h ·1	Aug. 3 ^d 06 ^h ·0	12 ^d 21 ^h ·2	23 ^d 13 ^h ·3
7 ^d 20 ^h ·5	18 ^d 12 ^h ·3	28 ^d 03 ^h ·4	7 ^d 18 ^h ·4	17 ^d 09 ^h ·6	28 ^d 01 ^h ·9
12 ^d 09 ^h ·0	23 ^d 00 ^h ·7	July 2 ^d 15 ^h ·8	12 ^d 06 ^h ·7	21 ^d 22 ^h ·0	Nov. 1 ^d 14 ^h ·4
16 ^d 21 ^h ·4	27 ^d 13 ^h ·1	7 ^d 04 ^h ·1	16 ^d 19 ^h ·0	26 ^d 10 ^h ·5	6 ^d 02 ^h ·9
21 ^d 09 ^h ·9	June 1 ^d 01 ^h ·4	11 ^d 16 ^h ·5	21 ^d 07 ^h ·4	30 ^d 22 ^h ·9	10 ^d 15 ^h ·4
25 ^d 22 ^h ·3	5 ^d 13 ^h ·8	16 ^d 04 ^h ·8	25 ^d 19 ^h ·7	Oct. 5 ^d 11 ^h ·4	15 ^d 03 ^h ·9
30 ^d 10 ^h ·7	10 ^d 02 ^h ·1	20 ^d 17 ^h ·1	30 ^d 08 ^h ·1	9 ^d 23 ^h ·9	19 ^d 16 ^h ·4
May 4 ^d 23 ^h ·1	14 ^d 14 ^h ·4	25 ^d 05 ^h ·4	Sept. 3 ^d 20 ^h ·5	14 ^d 12 ^h ·3	

TITAN.

Greenwich Mean Time of Greatest Elongation.

Apr. 2 ^d 16 ^h ·9 W.	May 12 ^d 07 ^h ·4 E.	June 21 ^d 09 ^h ·2 W.	July 30 ^d 19 ^h ·8 E.	Sept. 8 ^d 21 ^h ·3 W.	Oct. 18 ^d 11 ^h ·8 E.
10 ^d 09 ^h ·7 E.	20 ^d 13 ^h ·5 W.	29 ^d 01 ^h ·0 E.	Aug. 8 ^d 01 ^h ·5 W.	16 ^d 13 ^h ·7 E.	26 ^d 18 ^h ·6 W.
18 ^d 16 ^h ·3 W.	28 ^d 05 ^h ·6 E.	July 7 ^d 06 ^h ·6 W.	15 ^d 17 ^h ·4 E.	24 ^d 19 ^h ·9 W.	Nov. 3 ^d 11 ^h ·5 E.
26 ^d 08 ^h ·8 E.	June 5 ^d 11 ^h ·5 W.	14 ^d 22 ^h ·4 E.	23 ^d 23 ^h ·2 W.	Oct. 2 ^d 12 ^h ·5 E.	11 ^d 18 ^h ·5 W.
May 4 ^d 15 ^h ·1 W.	13 ^d 03 ^h ·5 E.	23 ^d 04 ^h ·0 W.	31 ^d 15 ^h ·4 E.	10 ^d 19 ^h ·0 W.	

HYPERION.

Greenwich Mean Time of Greatest Elongation.

Apr. 4 ^d 18 ^h ·4 E.	May 17 ^d 05 ^h ·2 E.	June 28 ^d 13 ^h ·0 E.	Aug. 9 ^d 21 ^h ·5 E.	Sept. 21 ^d 11 ^h ·0 E.	Nov. 3 ^d 07 ^h ·7 E.
15 ^d 16 ^h ·8 W.	28 ^d 01 ^h ·6 W.	July 9 ^d 09 ^h ·6 W.	20 ^d 19 ^h ·5 W.	Oct. 2 ^d 10 ^h ·0 W.	14 ^d 05 ^h ·9 W.
26 ^d 00 ^h ·2 E.	June 7 ^d 09 ^h ·3 E.	19 ^d 16 ^h ·9 E.	31 ^d 03 ^h ·3 E.	12 ^d 20 ^h ·5 E.	
May 6 ^d 21 ^h ·4 W.	18 ^d 05 ^h ·6 W.	30 ^d 14 ^h ·1 W.	Sept. 11 ^d 02 ^h ·1 W.	23 ^d 19 ^h ·3 W.	

JAPETUS.

Greenwich Mean Time of Conjunction and Greatest Elongation.

Apr. 2 ^d 04 ^h ·5 E.	May 12 ^d 14 ^h ·3 W.	June 20 ^d 08 ^h ·0 E.	July 29 ^d 22 ^h ·0 W.	Sept. 6 ^d 16 ^h ·9 E.	Oct. 16 ^d 21 ^h ·6 W.
21 ^d 18 ^h ·5 I.	June 1 ^d 16 ^h ·0 S.	July 9 ^d 11 ^h ·1 I.	Aug. 18 ^d 22 ^h ·5 S.	26 ^d 00 ^h ·3 I.	Nov. 6 ^d 10 ^h ·5 S.
					25 ^d 16 ^h ·6 E.

SATELLITES OF SATURN, 1931.

623

DIFFERENTIAL CO-ORDINATES OF PHOEBE.

Date.	$\alpha_p - \alpha_s$	$\delta_p - \delta_s$	Date.	$\alpha_p - \alpha_s$	$\delta_p - \delta_s$	Date.	$\alpha_p - \alpha_s$	$\delta_p - \delta_s$
Feb. 7	^m -0 08.5	^s +2 27	May 22	^m +2 00.0	^s +4 57	Sept. 3	^m +1 58.6	^s +0 54
9	0 05.7	2 31	24	2 01.7	4 56	5	1 56.6	0 49
11	0 02.9	2 35	26	2 03.3	4 54	7	1 54.6	0 44
13	-0 00.1	2 38	28	2 04.8	4 53	9	1 52.4	0 39
15	+0 02.7	2 42	30	2 06.3	4 52	11	1 50.2	0 34
17	+0 05.5	+2 46	June 1	+2 07.7	+4 50	13	+1 48.0	+0 29
19	0 08.4	2 50	3	2 09.1	4 48	15	1 45.6	0 24
21	0 11.2	2 54	5	2 10.4	4 45	17	1 43.2	0 20
23	0 14.0	2 58	7	2 11.7	4 43	19	1 40.7	0 15
25	0 16.8	3 02	9	2 12.9	4 40	21	1 38.2	0 10
27	+0 19.6	+3 06	11	+2 14.0	+4 37	23	+1 35.6	+0 06
Mar. 1	0 22.4	3 10	13	2 15.1	4 34	25	1 32.9	+0 02
3	0 25.2	3 14	15	2 16.2	4 31	27	1 30.1	-0 03
5	0 28.0	3 18	17	2 17.1	4 27	29	1 27.3	0 07
7	0 30.8	3 23	19	2 18.0	4 23	Oct. 1	1 24.5	0 11
9	+0 33.6	+3 27	21	+2 18.9	+4 19	3	+1 21.6	-0 15
11	0 36.3	3 31	23	2 19.6	4 15	5	1 18.6	0 20
13	0 39.1	3 35	25	2 20.3	4 11	7	1 15.6	0 24
15	0 41.8	3 39	27	2 21.0	4 06	9	1 12.5	0 27
17	0 44.6	3 43	29	2 21.6	4 02	11	1 09.4	0 31
19	+0 47.3	+3 47	July 1	+2 22.1	+3 57	13	+1 06.2	-0 35
21	0 50.0	3 51	3	2 22.5	3 52	15	1 03.0	0 39
23	0 52.6	3 55	5	2 22.8	3 47	17	0 59.8	0 43
25	0 55.3	3 59	7	2 23.1	3 42	19	0 56.5	0 47
27	0 57.9	4 03	9	2 23.4	3 36	21	0 53.2	0 51
29	+1 00.5	+4 07	11	+2 23.5	+3 31	23	+0 49.8	-0 54
31	1 03.1	4 11	13	2 23.6	3 25	25	0 46.4	0 58
Apr. 2	1 05.7	4 14	15	2 23.6	3 20	27	0 43.0	1 02
4	1 08.3	4 18	17	2 23.5	3 14	29	0 39.6	1 06
6	1 10.8	4 21	19	2 23.4	3 08	31	0 36.1	1 10
8	+1 13.3	+4 25	21	+2 23.1	+3 02	Nov. 2	+0 32.6	-1 14
10	1 15.8	4 28	23	2 22.8	2 56	4	0 29.1	1 17
12	1 18.2	4 31	25	2 22.4	2 50	6	0 25.6	1 21
14	1 20.7	4 34	27	2 22.0	2 44	8	0 22.1	1 25
16	1 23.1	4 37	29	2 21.5	2 38	10	0 18.6	1 29
18	+1 25.4	+4 39	31	+2 20.9	+2 32	12	+0 15.0	-1 33
20	1 27.8	4 42	Aug. 2	2 20.2	2 26	14	0 11.5	1 36
22	1 30.1	4 44	4	2 19.4	2 20	16	0 08.0	1 40
24	1 32.3	4 46	6	2 18.6	2 14	18	0 04.4	1 44
26	1 34.6	4 48	8	2 17.7	2 08	20	+0 00.9	1 48
28	+1 36.8	+4 50	10	+2 16.7	+2 02	22	-0 02.6	-1 52
30	1 38.9	4 52	12	2 15.6	1 56	24	0 06.1	1 56
May 2	1 41.1	4 53	14	2 14.4	1 50	26	0 09.6	2 00
4	1 43.2	4 55	16	2 13.2	1 44	28	0 13.0	2 05
6	1 45.2	4 56	18	2 11.9	1 38	30	0 16.5	2 09
8	+1 47.2	+4 57	20	+2 10.5	+1 32	Dec. 2	-0 19.9	-2 13
10	1 49.2	4 57	22	2 09.0	1 27	4	0 23.2	2 17
12	1 51.1	4 58	24	2 07.5	1 21	6	0 26.6	2 21
14	1 53.0	4 58	26	2 05.9	1 16	8	0 29.9	2 25
16	1 54.8	4 58	28	2 04.2	1 10	10	0 33.2	2 29
18	+1 56.6	+4 58	30	+2 02.4	+1 05	12	-0 36.4	-2 34
20	+1 58.3	+4 57	Sept. 1	+2 00.6	+1 00	14	-0 39.5	-2 38

SATELLITES OF SATURN, 1931.

Date.		MIMAS.		ENCELADUS.		TETHYS.		DIONE.	
		$P-P_0$	$\frac{a(\rho)}{\rho}$	$P-P_0$	$\frac{a(\rho)}{\rho}$	$P-P_0$	$\frac{a(\rho)}{\rho}$	$P-P_0$	$\frac{a(\rho)}{\rho}$
Mar.	27	+0.4	24.9	+0.2	32.0	-1.0	39.6	+0.2	50.7
Apr.	1	0.5	25.1	0.2	32.2	1.0	39.9	0.2	51.1
	6	0.7	25.3	0.2	32.5	1.0	40.2	0.2	51.5
	11	0.8	25.5	0.2	32.7	1.0	40.5	0.2	51.9
	16	1.0	25.7	0.2	33.0	1.0	40.9	0.2	52.3
	21	+1.1	26.0	+0.2	33.3	-1.0	41.2	+0.2	52.8
	26	1.3	26.2	0.2	33.6	1.0	41.6	0.2	53.2
May	1	1.4	26.4	0.2	33.9	1.0	41.9	0.2	53.7
	6	1.5	26.6	0.2	34.1	1.0	42.3	0.2	54.1
	11	1.6	26.8	0.2	34.4	1.0	42.6	0.2	54.5
	16	+1.6	27.0	+0.2	34.7	-1.0	42.9	+0.2	55.0
	21	1.7	27.2	0.2	34.9	1.0	43.2	0.2	55.4
	26	1.8	27.4	0.2	35.2	1.0	43.5	0.2	55.8
	31	1.8	27.6	0.2	35.4	1.0	43.8	0.2	56.1
June	5	1.9	27.8	0.2	35.6	1.0	44.1	0.2	56.5
	10	+1.9	27.9	+0.1	35.8	-1.0	44.3	+0.2	56.8
	15	1.9	28.0	0.1	36.0	1.0	44.5	0.2	57.0
	20	1.9	28.2	0.1	36.1	1.0	44.7	0.2	57.3
	25	1.9	28.3	0.1	36.2	1.0	44.9	0.2	57.5
	30	1.9	28.3	0.1	36.3	1.0	45.0	0.2	57.6
July	5	+1.8	28.4	+0.1	36.4	-1.0	45.1	+0.2	57.7
	10	1.8	28.4	0.1	36.5	1.0	45.1	0.2	57.8
	15	1.7	28.4	0.1	36.5	1.0	45.1	0.1	57.8
	20	1.6	28.4	0.1	36.4	1.1	45.1	0.1	57.8
	25	1.6	28.4	0.1	36.4	1.1	45.0	0.1	57.7
	30	+1.5	28.3	+0.1	36.3	-1.1	44.9	+0.1	57.5
Aug.	4	1.4	28.2	0.0	36.2	1.1	44.8	0.1	57.3
	9	1.2	28.1	0.0	36.0	1.1	44.6	0.1	57.1
	14	1.1	28.0	0.0	35.9	1.1	44.4	0.1	56.9
	19	1.0	27.8	0.0	35.7	1.1	44.2	0.1	56.6
	24	+0.9	27.7	0.0	35.5	-1.1	43.9	+0.1	56.3
	29	0.7	27.5	0.0	35.3	1.1	43.7	0.1	55.9
Sept.	3	0.6	27.3	0.0	35.0	1.1	43.4	0.1	55.5
	8	0.4	27.1	0.0	34.8	1.1	43.1	0.1	55.1
	13	0.3	26.9	0.0	34.5	1.1	42.7	0.1	54.7
	18	+0.1	26.7	0.0	34.2	-1.1	42.4	+0.1	54.3
	23	0.0	26.5	0.0	34.0	1.1	42.1	0.1	53.8
	28	-0.2	26.3	0.0	33.7	1.1	41.7	0.1	53.4
Oct.	3	0.3	26.0	0.0	33.4	1.1	41.4	0.1	53.0
	8	0.5	25.8	0.0	33.1	1.0	41.0	0.1	52.5
	13	-0.6	25.6	0.0	32.9	-1.0	40.7	+0.1	52.1
	18	0.8	25.4	0.0	32.6	1.0	40.3	0.1	51.7
	23	0.9	25.2	0.0	32.3	1.0	40.0	0.1	51.2
	28	1.0	25.0	0.0	32.1	1.0	39.7	0.1	50.8
Nov.	2	1.1	24.8	0.0	31.8	1.0	39.4	0.1	50.4
	7	-1.2	24.6	+0.1	31.6	-0.9	39.1	+0.1	50.1
	12	1.3	24.4	0.1	31.4	0.9	38.8	0.1	49.7
	17	-1.4	24.3	+0.1	31.2	-0.9	38.6	+0.1	49.4

Date.		RHEA.		TITAN.		HYPERION.		JAPETUS.	
		$P-P_0$	$\frac{a(p)}{p}$	$P-P_0$	$\frac{a(p)}{p}$	$P-P_0$	$\frac{a(p)}{p}$	$P-P_0$	$\frac{a(p)}{p}$
Mar.	27	+0.5	70.7	-0.1	164	-0.3	199	-0.4	478
Apr.	1	0.5	71.3	0.1	165	0.2	200	0.4	482
	6	0.5	71.9	0.1	167	0.2	202	0.5	486
	11	0.5	72.5	0.1	168	0.2	204	0.5	490
	16	0.5	73.1	0.1	169	0.2	205	0.6	494
	21	+0.5	73.7	-0.1	171	-0.2	207	-0.6	498
	26	0.5	74.3	0.1	172	0.2	209	0.6	502
May	1	0.5	75.0	0.1	174	0.2	211	0.6	506
	6	0.5	75.6	0.1	175	0.2	212	0.6	511
	11	0.5	76.2	0.1	177	0.2	214	0.6	515
	16	+0.5	76.8	-0.1	178	-0.2	216	-0.6	519
	21	0.5	77.3	0.1	179	0.2	217	0.6	523
	26	0.5	77.9	0.1	181	0.2	219	0.5	526
	31	0.5	78.4	0.1	182	0.2	220	0.5	530
June	5	0.5	78.9	0.1	183	0.2	222	0.4	533
	10	+0.5	79.3	-0.1	184	-0.2	223	-0.4	536
	15	0.5	79.7	0.1	185	0.3	224	0.3	538
	20	0.4	80.0	0.2	185	0.3	225	0.2	540
	25	0.4	80.3	0.2	186	0.3	225	0.1	542
	30	0.4	80.5	0.2	187	0.3	226	-0.1	544
July	5	+0.4	80.6	-0.2	187	-0.3	226	0.0	545
	10	0.4	80.7	0.2	187	0.3	227	+0.1	545
	15	0.4	80.7	0.2	187	0.3	227	0.2	545
	20	0.4	80.7	0.2	187	0.3	227	0.3	545
	25	0.4	80.5	0.2	187	0.3	226	0.4	544
	30	+0.4	80.4	-0.2	186	-0.3	226	+0.5	543
Aug.	4	0.4	80.1	0.2	186	0.3	225	0.5	541
	9	0.4	79.8	0.2	185	0.4	224	0.6	539
	14	0.4	79.5	0.2	184	0.4	223	0.7	537
	19	0.4	79.0	0.2	183	0.4	222	0.8	534
	24	+0.4	78.6	-0.2	182	-0.4	221	+0.8	531
	29	0.4	78.1	0.2	181	0.4	219	0.9	528
Sept.	3	0.3	77.6	0.2	180	0.4	218	0.9	524
	8	0.3	77.0	0.2	179	0.4	216	0.9	520
	13	0.3	76.4	0.2	177	0.4	215	1.0	516
	18	+0.3	75.8	-0.2	176	-0.4	213	+1.0	512
	23	0.3	75.2	0.2	174	0.4	211	1.0	508
	28	0.3	74.6	0.2	173	0.4	210	1.0	504
Oct.	3	0.3	74.0	0.2	171	0.4	208	0.9	500
	8	0.4	73.4	0.2	170	0.4	206	0.9	496
	13	+0.4	72.8	-0.2	169	-0.4	204	+0.9	492
	18	0.4	72.1	0.2	167	0.4	203	0.8	487
	23	0.4	71.6	0.2	166	0.4	201	0.8	484
	28	0.4	71.0	0.2	165	0.4	199	0.7	480
Nov.	2	0.4	70.5	0.2	163	0.3	198	0.6	476
	7	+0.4	69.9	-0.2	162	-0.3	196	+0.6	472
	12	0.4	69.4	0.2	161	0.3	195	0.5	469
	17	+0.4	69.0	-0.2	160	-0.3	194	+0.4	466

SATELLITES OF SATURN, 1931.

Time from Eastern Elongation.	MIMAS.		Time from Eastern Elongation.	ENCELADUS.		TETHYS.		Time from Eastern Elongation.	DIONE.	
	p^1	F		p^1	F	p^1	F		p^1	F
^h 00.0	97.0	1.000	^d ^h 0 00	97.0	1.000	97.0	1.000	^d ^h 0 00	97.0	1.000
00.5	100.1	0.992	0 01	101.4	0.985	100.2	0.992	0 02	101.4	0.985
01.0	103.3	0.968	0 02	106.1	0.940	103.5	0.968	0 04	106.1	0.940
01.5	106.8	0.928	0 03	111.4	0.868	107.1	0.929	0 06	111.4	0.867
02.0	110.6	0.874	0 04	117.9	0.773	111.0	0.876	0 08	118.0	0.772
02.5	115.0	0.808	0 05	126.4	0.663	115.5	0.811	0 10	126.5	0.662
03.0	120.2	0.732	0 06	138.5	0.550	120.8	0.736	0 12	138.5	0.548
03.5	126.7	0.649	0 07	156.2	0.452	127.4	0.655	0 14	156.4	0.451
04.0	135.2	0.564	0 08	181.0	0.401	136.0	0.572	0 16	181.2	0.400
04.5	146.5	0.486	0 09	207.6	0.422	147.2	0.496	0 18	207.9	0.422
05.0	161.7	0.423	0 10	228.5	0.503	162.2	0.435	0 20	228.8	0.504
05.5	180.7	0.391	0 11	242.9	0.612	180.6	0.404	0 22	243.0	0.614
06.0	200.9	0.399	0 12	252.6	0.726	200.1	0.411	1 00	252.8	0.727
06.5	218.6	0.444	0 13	259.9	0.828	217.5	0.454	1 02	260.0	0.830
07.0	232.2	0.514	0 14	265.6	0.911	231.0	0.521	1 04	265.7	0.912
07.5	242.3	0.594	0 15	270.6	0.968	241.3	0.601	1 06	270.7	0.969
08.0	250.0	0.681	0 16	275.1	0.997	249.0	0.683	1 08	275.2	0.997
08.5	255.9	0.762	0 17	279.4	0.995	255.3	0.763	1 10	279.5	0.995
09.0	260.8	0.834	0 18	284.0	0.963	260.2	0.835	1 12	284.1	0.962
09.5	264.9	0.896	0 19	289.0	0.903	264.4	0.896	1 14	289.1	0.901
10.0	268.6	0.945	0 20	294.9	0.817	268.2	0.944	1 16	295.0	0.815
10.5	271.9	0.979	0 21	302.4	0.713	271.6	0.978	1 18	302.6	0.710
11.0	275.1	0.997	0 22	312.6	0.599	274.9	0.997	1 20	312.9	0.596
11.5	278.2	0.999	0 23	327.5	0.491	278.1	0.999	1 22	328.0	0.488
12.0	281.3	0.984	1 00	349.3	0.416	281.3	0.985	2 00	350.0	0.414
12.5	284.6	0.954	1 01	16.2	0.404	284.7	0.956	2 02	17.0	0.404
13.0	288.2	0.909	1 02	40.2	0.462	288.4	0.912	2 04	40.9	0.464
13.5	292.2	0.850	1 03	57.2	0.562	292.5	0.855	2 06	57.7	0.566
14.0	296.8	0.780	1 04	68.7	0.676	297.2	0.786	2 08	69.0	0.680
14.5	302.5	0.700	1 05	76.9	0.785	302.9	0.708	2 10	77.2	0.788
15.0	309.7	0.616	1 06	83.2	0.877	310.1	0.626	2 12	83.4	0.880
15.5	319.1	0.533	1 07	88.4	0.946	319.5	0.545	2 14	88.7	0.948
16.0	331.8	0.459	1 08	93.1	0.988	332.0	0.472	2 16	93.3	0.989
16.5	348.6	0.407	1 09	97.5	1.000	348.2	0.420	2 18	97.7	1.000
17.0	8.5	0.389	1 10	101.9	0.981	7.4	0.402	2 20	102.1	0.980
17.5	28.1	0.413	1 11			26.5	0.422			
18.0	44.3	0.469	1 12			42.6	0.475			
18.5	56.4	0.545	1 13			54.9	0.548			
19.0	65.5	0.629	1 14			64.3	0.629			
19.5	72.4	0.712	1 15			71.3	0.712			
20.0	77.9	0.790	1 16			77.0	0.789			
20.5	82.4	0.859	1 17			81.7	0.857			
21.0	86.4	0.916	1 18			85.8	0.914			
21.5	89.9	0.960	1 19			89.4	0.958			
22.0	93.1	0.988	1 20			92.8	0.986			
22.5	96.3	0.999	1 21			96.0	0.999			
23.0	99.4	0.995	1 22			99.2	0.996			

Position angle of satellite $p = p^1 + (P - P_0)$ Apparent distance of satellite $s = F \frac{a(p)}{p}$

SATELLITES OF SATURN, 1931.

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Time from Eastern Elongation.	RHEA.		Time from Eastern Elongation.	TITAN.		HYPERION.		Time from Eastern Elongation.	JAPETUS.	
	p^1	F		p^1	F	p^1	F		p^1	F
d h	97°0	1.000	d h	97°0	0.997	97°0	1.098	d	97°0	0.973
0 00	101°0	0.987	0 10	100°8	0.990	99°4	1.095	2	98°5	0.962
0 03	105°2	0.950	0 20	104°6	0.961	101°7	1.082	4	100°1	0.925
0 06	109°9	0.889	1 06	108°9	0.912	104°2	1.058	6	101°9	0.864
0 09	115°3	0.809	1 16	113°7	0.844	106°8	1.025	8	104°0	0.782
0 12	122°2	0.713	2 02	119°5	0.762	109°6	0.982	10	106°7	0.681
0 15	131°2	0.609	2 12	126°7	0.670	112°7	0.930	12	110°4	0.564
0 18	144°0	0.508	2 22	136°4	0.576	116°2	0.870	14	116°3	0.435
0 21	162°4	0.429	3 08	149°7	0.489	120°3	0.804	16	127°1	0.304
1 00	186°1	0.397	3 18	167°8	0.427	125°1	0.733	18	152°4	0.193
1 03	210°1	0.425	4 04	189°6	0.407	130°9	0.659	20	203°6	0.167
1 06	228°9	0.502	4 14	210°8	0.438	138°3	0.586	22	239°3	0.257
1 09	242°0	0.602	5 00	227°7	0.508	147°6	0.517	24	253°9	0.384
1 12	251°3	0.706	5 10	240°0	0.597	159°6	0.459	26	261°1	0.515
1 15	258°2	0.802	5 20	249°0	0.692	174°5	0.420	28	265°4	0.639
1 18	263°8	0.884	6 06	255°9	0.783	191°2	0.408	30	268°4	0.751
2 00	268°5	0.946	6 16	261°4	0.863	207°8	0.425	32	270°7	0.846
2 03	272°7	0.986	7 02	266°0	0.927	222°2	0.467	34	272°5	0.924
2 06	276°6	1.000	7 12	270°1	0.973	233°7	0.525	36	274°1	0.980
2 09	280°7	0.989	7 22	273°9	0.998	242°8	0.592	38	275°5	1.015
2 12	284°9	0.953	8 08	277°6	1.001	250°1	0.661	40	276°9	1.027
2 15	289°5	0.894	8 18	281°4	0.981	256°0	0.727	42	278°2	1.016
2 18	294°9	0.815	9 04	285°4	0.939	260°9	0.785	44	279°7	0.982
2 21	301°6	0.720	9 14	289°9	0.876	265°2	0.834	46	281°2	0.926
3 00	310°5	0.616	10 00	295°2	0.795	269°1	0.870	48	283°1	0.848
3 03	323°0	0.515	10 10	301°9	0.700	272°8	0.893	50	285°3	0.751
3 06	340°9	0.434	10 20	310°8	0.597	276°3	0.901	52	288°3	0.638
3 09	4°4	0.397	11 06	323°3	0.498	279°8	0.894	54	292°7	0.512
3 12	28°6	0.422	11 16	341°3	0.419	283°4	0.872	56	300°1	0.378
3 15	47°8	0.496	12 02	5°0	0.384	287°3	0.835	58	315°5	0.248
3 18	61°2	0.594	12 12	29°2	0.410	291°6	0.785	60	354°5	0.161
3 21	70°7	0.699	12 22	48°3	0.483	296°6	0.725	62	46°0	0.199
4 00	77°8	0.796	13 08	61°6	0.580	302°6	0.656	64	69°2	0.318
4 03	83°4	0.879	13 18	71°0	0.683	310°0	0.583	66	79°1	0.453
4 06	88°2	0.943	14 04	77°9	0.779	319°5	0.512	68	84°6	0.582
4 09	92°4	0.984	14 14	83°4	0.862	331°9	0.449	70	88°1	0.699
4 12	96°6	1.000	15 00	88°1	0.928	347°6	0.406	72	90°6	0.799
4 15	100°4	0.991	15 10	92°3	0.972	5°7	0.392	74	92°7	0.878
			15 20	96°0	0.994	23°6	0.411	76	94°4	0.934
			16 06	99°7	0.994	38°8	0.458	78	96°0	0.966
			16 16			50°6	0.523	80	97°5	0.972
			17 02			59°7	0.600	82	99°0	0.952
			17 12			66°7	0.678			
			17 22			72°2	0.755			
			18 08			76°7	0.828			
			18 18			80°6	0.894			
			19 04			83°9	0.952			
			19 14			86°9	1.001			
			20 00			89°6	1.041			
			20 10			92°1	1.071			
			20 20			94°5	1.090			
			21 06			96°9	1.098			
			21 16			99°3	1.096			

Position angle of satellite $p = p^1 + (P - P_0)$

Apparent distance of satellite $s = \frac{F^a(p)}{p}$

SATELLITES OF SATURN, 1931.

DIFFERENTIAL CO-ORDINATES OF HYPERION.

Date.	$\alpha_H - \alpha_S$	$\delta_H - \delta_S$	Date.	$\alpha_H - \alpha_S$	$\delta_H - \delta_S$	Date.	$\alpha_H - \alpha_S$	$\delta_H - \delta_S$
Mar. 28	- 7.3	+7.0	May 6	-13.3	0	June 14	- 3.3	-8.1
29	- 3.4 +3.9	+76 + 6	7	-13.5	-0.2 +27 +27	15	- 7.6 -4.3	-63 +18
30	+ 0.9 +4.3	+74 - 2	8	-12.1 +1.4	+51 +24	16	-11.2 -3.6	-39 +24
31	+ 5.1 +4.2	+66 - 8	9	- 9.3 +2.8	+69 +18	17	-13.6 -2.4	-11 +28
Apr. 1	+ 8.9 +3.8	+51 -15	10	- 5.5 +3.8	+79 +10	18	-14.4 -0.8	+18 +29
		+3.1 -19			+4.5 + 2			+18 +28
2	+12.0	+32	11	- 1.0	+81	19	-13.5	+46
3	+14.2 +2.2	+11 -21	12	+ 3.6 +4.6	+75 - 6	20	-11.0 +2.5	+68 +22
4	+15.4 +1.2	-11 -22	13	+ 7.9 +4.3	+62 -13	21	- 7.2 +3.8	+82 +14
5	+15.6 +0.2	-32 -21	14	+11.6 +3.7	+44 -18	22	- 2.7 +4.5	+88 + 6
6	+14.8 -0.8	-32 -19	15	+14.3 +2.7	+22 -22	23	+ 2.2 +4.9	+84 - 4
		-1.9 -16			+1.8 -23			+4.7 -12
7	+12.9	-67	16	+16.1	- 1	24	+ 6.9	+72
8	+10.2 -2.7	-79 -12	17	+16.8 +0.7	-24 -23	25	+11.0 +4.1	+55 -17
9	+ 6.8 -3.4	-85 - 6	18	+16.3 -0.5	-46 -22	26	+14.3 +3.3	+33 -22
10	+ 2.9 -3.9	-85 0	19	+14.8 -1.5	-65 -19	27	+16.5 +2.2	+ 8 -25
11	- 1.3 -4.2	-78 + 7	20	+12.3 -2.5	-80 -15	28	+17.6 +1.1	-25
		-4.0 +13			-3.4 - 9			-17 -24
12	- 5.3	-65	21	+ 8.9	-89	29	+17.4	-41
13	- 8.9 -3.6	-46 +19	22	+ 4.9 -4.0	-92 - 3	30	+16.2 -1.2	-63 -22
14	-11.6 -2.7	-22 +24	23	+ 0.5 -4.4	-88 + 4	1	+13.9 -2.3	-80 -17
15	-13.0 -1.4	+ 5 +27	24	- 4.0 -4.5	-76 +12	2	+10.6 -3.3	-92 -12
16	-12.9 +0.1	+31 +26	25	- 8.1 -4.1	-58 +18	3	+ 6.6 -4.0	-98 - 6
		+1.6 +22			-3.3 +24			-4.5 + 2
17	-11.3	+53	26	-11.4	-34	4	+ 2.1	-96
18	- 8.4 +2.9	+69 +16	27	-13.5	- 6 +28	5	- 2.6 -4.7	-69 +10
19	- 4.5 +3.9	+78 + 9	28	-14.0 -0.5	+23 +29	6	- 7.1 -4.5	-69 +17
20	- 0.1 +4.4	+78 0	29	-12.9 +1.1	+49 +20	7	-10.8 -3.7	-46 +23
21	+ 4.4 +4.5	+70 - 8	30	-10.2 +2.7	+69 +26	8	-13.5 -2.7	-18 +28
		+4.0 -14			+3.8 +12			-1.1 +31
22	+ 8.4	+56	31	- 6.4	+81	9	-14.6	+13
23	+11.8 +3.4	+38 -18	1	- 1.9 +4.5	+85 + 4	10	-14.0 +0.6	+42 +29
24	+14.3 +2.5	+17 -21	2	+ 2.9 +4.8	+80 - 5	11	-11.7 +2.3	+66 +24
25	+15.8 +1.5	- 6 -23	3	+ 7.4 +4.5	+68 -12	12	- 8.0 +3.7	+82 +16
26	+16.2 +0.4	-28 -22	4	+11.3 +3.9	+50 -18	13	- 3.5 +4.5	+89 + 7
		-0.6 -20			+3.1 -22			+4.9 - 2
27	+15.6	-48	5	+14.4	+28	14	+ 1.4	+87
28	+13.9 -1.7	-66 -18	6	+16.4 +2.0	+ 4 -24	15	+ 6.2 +4.8	+77 -10
29	+11.3 -2.6	-79 -13	7	+17.3 +0.9	-21 -25	16	+10.5 +4.3	+60 -17
30	+ 7.9 -3.4	-87 - 8	8	+17.0 -0.3	-44 -23	17	+13.9 +3.4	+38 -22
May 1	+ 3.9 -4.0	-89 - 2	9	+15.6 -1.4	-64 -20	18	+16.3 +2.4	-25
		-4.3 + 6			-2.4 -16			+1.3 +13
2	- 0.4	-83	10	+13.2	-80	19	+17.6	-13
3	- 4.6 -4.2	-70 +13	11	+ 9.8 -3.4	-91 -11	20	+17.6 0.0	-38 -25
4	- 8.5 -3.9	-51 +19	12	+ 5.8 -4.0	-95 - 4	21	+16.5 -1.1	-60 -22
5	-11.5 -3.0	-27 +24	13	+ 1.3 -4.5	-92 + 3	22	+14.4 -2.1	-78 -18
6	-13.3 -1.8	0 +27	14	- 3.3 -4.6	-81 +11	23	+11.2 -3.2	-92 -14

SATELLITES OF SATURN, 1931.

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DIFFERENTIAL CO-ORDINATES OF HYPERION.

Date.	$\alpha_H - \alpha_S$	$\delta_H - \delta_S$	Date.	$\alpha_H - \alpha_S$	$\delta_H - \delta_S$	Date.	$\alpha_H - \alpha_S$	$\delta_H - \delta_S$
July 23	+11.2	-92	Aug. 31	+17.3	-26	Oct. 9	+9.3	+59
24	+7.3	-3.9	Sept. 1	+16.7	-0.6	10	+12.5	+3.2
25	+2.9	-4.4	2	+15.0	-1.7	11	+14.7	+2.2
26	-1.8	-4.7	3	+12.4	-2.6	12	+15.9	+1.2
27	-6.3	-4.5	4	+8.9	-3.5	13	+16.1	+0.2
	-3.9	-74		-4.1	-95		-0.9	-30
		+23			-3			-21
28	-10.2	-2.9	5	+4.8	-98	14	+15.2	-1.8
29	-13.1	-1.4	6	+0.4	-4.4	15	+13.4	-2.7
30	-14.5	+0.3	7	-4.1	-4.5	16	+10.7	-3.4
31	-14.2	+2.0	8	-8.1	-4.0	17	+7.3	-3.9
Aug. 1	-12.2	+3.5	9	-11.4	-2.0	18	+3.4	-4.2
		+18			+29			-90
2	-8.7	+4.4	10	-13.4	-0.5	19	-0.8	-4.1
3	-4.3	+4.8	11	-13.9	+1.1	20	-4.9	-3.6
4	+0.5	+4.9	12	-12.8	+2.7	21	-8.5	-2.7
5	+5.4	+4.3	13	-10.1	+3.8	22	-11.2	-1.6
6	+9.7	+3.5	14	-6.3	+4.4	23	-12.8	0.0
		-21			+4			+28
7	+13.2	+2.6	15	-1.9	+4.7	24	-12.8	+1.4
8	+15.8	+1.5	16	+2.8	+4.3	25	-11.4	+2.8
9	+17.3	+0.3	17	+7.1	+3.8	26	-8.6	+3.7
10	+17.6	-0.9	18	+10.9	+3.0	27	-4.9	+4.2
11	+16.7	-2.0	19	+13.9	+1.9	28	-0.7	+4.3
		-19			+24			+81
12	+14.7	-2.9	20	+15.8	+0.9	29	+3.6	+3.9
13	+11.8	-3.7	21	+16.7	-0.3	30	+7.5	+3.3
14	+8.1	-4.3	22	+16.4	-1.2	31	+10.8	+2.6
15	+3.8	-4.6	23	+15.2	-2.3	Nov. 1	+13.4	+1.6
16	-0.8	-4.5	24	+12.9	-3.1	2	+15.0	+0.6
		+15			-11			+2
17	-5.3	-4.0	25	+9.8	-3.8	3	+15.6	-0.4
18	-9.3	-3.1	26	+6.0	-4.2	4	+15.2	-1.3
19	-12.4	-1.7	27	+1.8	-4.3	5	+13.9	-2.2
20	-14.1	0.0	28	-2.5	-4.1	6	+11.7	-3.0
21	-14.1	+1.6	29	-6.6	-3.5	7	+8.7	-3.6
		+27			+22			-84
22	-12.5	+3.1	30	-10.1	-2.4	8	+5.1	-4.0
23	-9.4	+4.1	Oct. 1	-12.5	-1.0	9	+1.1	-4.0
24	-5.3	+4.7	2	-13.5	+0.6	10	-2.9	-3.7
25	-0.6	+4.8	3	-12.9	+2.1	11	-6.6	-3.2
26	+4.2	+4.4	4	-10.8	+3.3	12	-9.8	-2.0
		-14			+15			-36
27	+8.6	+3.7	5	-7.5	+4.1	13	-11.8	-0.7
28	+12.3	+2.7	6	-3.4	+4.5	14	-12.5	+0.7
29	+15.0	+1.7	7	+1.1	+4.3	15	-11.8	+2.1
30	+16.7	+0.6	8	+5.4	+3.9	16	-9.7	+3.2
31	+17.3	-2.6	9	+9.3	+5.9	17	-6.5	+7.3

SATELLITES OF SATURN, 1931.

DIFFERENTIAL CO-ORDINATES OF JAPETUS.

Date.	$\alpha_J - \alpha_S$	$\delta_J - \delta_S$	Date.	$\alpha_J - \alpha_S$	$\delta_J - \delta_S$	Date.	$\alpha_J - \alpha_S$	$\delta_J - \delta_S$
Mar. 28	+30 ^s .3	-21 ["]	May 6	-33 ^s .3	+17 ["]	June 14	+32 ^s .3	-14 ["]
29	31 ^s .3	+1 ["] 0	7	34 ^s .5	-1 ["] 2	15	33 ^s .8	+1 ["] 5
30	32 ^s .1	0 ["] .8	8	35 ^s .5	1 ["] 0	16	35 ^s .0	1 ["] 2
31	32 ^s .7	0 ["] .6	9	36 ^s .3	0 ["] .8	17	36 ^s .0	1 ["] 0
Apr. 1	33 ^s .2	0 ["] .5	10	36 ^s .9	0 ["] .6	18	36 ^s .7	0 ["] .7
		+0 ["] .2			0 ["] .5			0 ["] .5
2	+33 ^s .4	0 ["] .0	11	-37 ^s .4	+50 ["]	19	+37 ^s .2	-53 ["]
3	33 ^s .4	-0 ["] .3	12	37 ^s .6	-0 ["] .2	20	37 ^s .4	+0 ["] .2
4	33 ^s .1	0 ["] .5	13	37 ^s .6	0 ["] .0	21	37 ^s .4	0 ["] .0
5	32 ^s .6	0 ["] .7	14	37 ^s .4	+0 ["] .2	22	37 ^s .1	-0 ["] .3
6	31 ^s .9	0 ["] .9	15	36 ^s .9	0 ["] .5	23	36 ^s .5	0 ["] .6
					0 ["] .7			0 ["] .8
7	+31 ^s .0	-1 ["] .1	16	-36 ^s .2	+76 ["]	24	+35 ^s .7	-84 ["]
8	29 ^s .9	1 ["] .3	17	35 ^s .3	1 ["] .1	25	34 ^s .6	-1 ["] .1
9	28 ^s .6	1 ["] .5	18	34 ^s .2	1 ["] .3	26	33 ^s .3	1 ["] .3
10	27 ^s .1	1 ["] .7	19	32 ^s .9	1 ["] .5	27	31 ^s .8	1 ["] .5
11	25 ^s .4	1 ["] .9	20	31 ^s .4	1 ["] .7	28	30 ^s .0	1 ["] .8
								2 ["] .0
12	+23 ^s .5	-2 ["] .0	21	-29 ^s .7	+92 ["]	29	+28 ^s .0	-102 ["]
13	21 ^s .5	2 ["] .2	22	27 ^s .8	+1 ["] .9	30	25 ^s .9	-2 ["] .1
14	19 ^s .3	2 ["] .3	23	25 ^s .7	2 ["] .1	1	23 ^s .5	2 ["] .4
15	17 ^s .0	2 ["] .4	24	23 ^s .4	2 ["] .3	2	21 ^s .0	2 ["] .5
16	14 ^s .6	2 ["] .5	25	21 ^s .0	2 ["] .4	3	18 ^s .4	2 ["] .6
					2 ["] .5			2 ["] .8
17	+12 ^s .1	-2 ["] .6	26	-18 ^s .5	+94 ["]	4	+15 ^s .6	-103 ["]
18	9 ^s .5	2 ["] .6	27	15 ^s .8	+2 ["] .7	5	12 ^s .7	-2 ["] .9
19	6 ^s .9	2 ["] .7	28	13 ^s .0	2 ["] .8	6	9 ^s .7	3 ["] .0
20	4 ^s .2	2 ["] .8	29	10 ^s .2	2 ["] .9	7	6 ^s .7	3 ["] .0
21	+1 ^s .4	2 ["] .8	30	7 ^s .3	3 ["] .0	8	3 ^s .6	3 ["] .1
								3 ["] .1
22	-1 ^s .4	-2 ["] .7	31	-4 ^s .3	+82 ["]	9	+0 ^s .5	-87 ["]
23	4 ^s .1	2 ["] .8	1	-1 ^s .3	+3 ["] .0	10	-2 ^s .6	-3 ["] .1
24	6 ^s .9	2 ["] .7	2	+1 ^s .8	3 ["] .1	11	5 ^s .7	3 ["] .1
25	9 ^s .6	2 ["] .7	3	4 ^s .9	3 ["] .1	12	8 ^s .8	3 ["] .1
26	12 ^s .3	2 ["] .6	4	7 ^s .9	3 ["] .0	13	11 ^s .8	3 ["] .0
					3 ["] .0			2 ["] .9
27	-14 ^s .9	-2 ["] .5	5	+10 ^s .9	+56 ["]	14	-14 ^s .7	-57 ["]
28	17 ^s .4	2 ["] .5	6	13 ^s .8	+2 ["] .9	15	17 ^s .5	-2 ["] .8
29	19 ^s .9	2 ["] .4	7	16 ^s .6	2 ["] .8	16	20 ^s .2	2 ["] .7
30	22 ^s .3	2 ["] .2	8	19 ^s .3	2 ["] .7	17	22 ^s .8	2 ["] .6
May 1	24 ^s .5	2 ["] .1	9	21 ^s .9	2 ["] .6	18	25 ^s .3	2 ["] .5
					2 ["] .4			2 ["] .3
2	-26 ^s .6	-1 ["] .9	10	+24 ^s .3	+20 ["]	19	-27 ^s .6	-18 ["]
3	28 ^s .5	1 ["] .8	11	26 ^s .6	+2 ["] .3	20	29 ^s .8	-2 ["] .2
4	30 ^s .3	1 ["] .6	12	28 ^s .7	2 ["] .1	21	31 ^s .8	2 ["] .0
5	31 ^s .9	1 ["] .4	13	30 ^s .6	1 ["] .9	22	33 ^s .5	1 ["] .7
6	-33 ^s .3	+1 ["] .7	14	+32 ^s .3	+1 ["] .7	23	-35 ^s .1	-1 ["] .6
					-1 ["] .4			+18 ["] .9

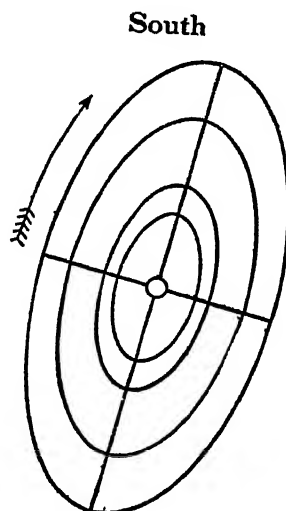
SATELLITES OF SATURN, 1931.

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DIFFERENTIAL CO-ORDINATES OF JAPETUS.

Date.	$\alpha_J - \alpha_S$	$\delta_J - \delta_S$	Date.	$\alpha_J - \alpha_S$	$\delta_J - \delta_S$	Date.	$\alpha_J - \alpha_S$	$\delta_J - \delta_S$
July 23	-35.1 ⁸	+ 18 ⁸	Aug. 31	+31.3 ⁸	- 13 ⁸	Oct. 9	-30.9 ⁸	+ 10 ⁸
24	36.4 -1.3	26 +8	Sept. 1	32.7 +1.4	22 -9	10	32.2 -1.3	18 +8
25	37.5 1.1	35 9	2	33.9 1.2	31 9	11	33.3 1.1	26 8
26	38.4 0.9	43 8	3	34.8 0.9	40 9	12	34.3 1.0	34 8
27	39.1 0.7	51 8	4	35.5 0.7	49 8	13	35.0 0.7	42 8
	0.4			0.4			0.5	7
28	-39.5	+ 59	5	+35.9	- 57	14	-35.5	+ 49
29	39.7 -0.2	66 +7	6	36.1 +0.2	65 -8	15	35.8 -0.3	56 +7
30	39.7 0.0	73 7	7	36.1 0.0	72 7	16	35.9 -0.1	63 7
31	39.4 +0.3	80 7	8	35.8 -0.3	79 7	17	35.8 +0.1	69 6
Aug. 1	38.9 0.5	86 6	9	35.3 0.5	85 6	18	35.5 0.3	75 6
	0.7			0.8			0.5	5
2	-38.2	+ 92	10	+34.5	- 91	19	-35.0	+ 80
3	37.2 +1.0	97 +5	11	33.5 -1.0	96 -5	20	34.3 +0.7	85 +5
4	36.0 1.2	101 4	12	32.2 1.3	101 4	21	33.4 0.9	90 5
5	34.6 1.4	105 4	13	30.7 1.5	105 5	22	32.4 1.0	94 4
6	33.0 1.6	108 3	14	29.1 1.6	108 3	23	31.1 1.3	97 3
	1.8			1.9			1.4	3
7	-31.2	+111	15	+27.2	-110	24	-29.7	+100
8	29.2 +2.0	113 +2	16	25.2 -2.0	111 -1	25	28.1 +1.6	102 +2
9	27.0 2.2	114 1	17	23.0 2.2	112 -1	26	26.4 1.7	103 1
10	24.6 2.4	115 +1	18	20.7 2.3	112 0	27	24.5 1.9	104 +1
11	22.1 2.5	115 0	19	18.3 2.4	111 +1	28	22.5 2.0	104 0
	2.6	-1		2.6			2.1	
12	-19.5	+114	20	+15.7	-110	29	-20.4	+104
13	16.7 +2.8	112 -2	21	13.0 -2.7	108 +2	30	18.1 +2.3	103 -1
14	13.8 2.9	110 2	22	10.3 2.7	105 3	31	15.7 2.4	101 2
15	10.9 2.9	107 3	23	7.5 2.8	102 3	Nov. 1	13.3 2.4	99 2
16	7.9 3.0	103 4	24	4.7 2.8	98 4	2	10.8 2.5	96 3
	3.0			2.8			2.6	3
17	-4.9	+ 99	25	+ 1.9	- 93	3	- 8.2	+ 93
18	- 1.9 +3.0	94 -5	26	- 1.0 -2.9	88 +5	4	5.6 +2.6	89 -4
19	+ 1.2 3.1	88 6	27	3.8 2.8	82 6	5	2.9 2.7	85 4
20	4.3 3.1	82 6	28	6.6 2.8	76 6	6	- 0.2 2.7	80 5
21	7.3 3.0	75 7	29	9.3 2.7	69 7	7	+ 2.4 2.6	74 6
	3.0			2.7			2.6	
22	+10.3	+ 68	30	-12.0	- 62	8	+ 5.0	+ 68
23	13.2 +2.9	60 -8	1	14.6 -2.6	55 +7	9	7.6 +2.6	62 -6
24	16.0 2.8	52 8	2	17.1 2.5	47 8	10	10.1 2.5	56 6
25	18.7 2.7	43 9	3	19.5 2.4	39 8	11	12.6 2.5	49 7
26	21.2 2.5	34 9	4	21.8 2.3	31 8	12	14.9 2.3	42 8
	2.4			2.1			2.3	
27	+23.6	+ 25	5	-23.9	- 23	13	+17.2	+ 34
28	25.8 +2.2	16 -9	6	25.9 -2.0	15 +8	14	19.4 +2.2	27 -7
29	27.8 2.0	+ 6 10	7	27.7 1.8	- 7 8	15	21.4 2.0	19 8
30	29.6 1.8	- 4 10	8	29.4 1.7	+ 1 8	16	23.3 1.9	12 7
31	+31.3 +1.7	- 13 -9	9	-30.9 -1.5	+ 10 +9	17	+25.0 +1.7	+ 4 -8

APPARENT ORBITS OF THE SATELLITES OF URANUS AT DATE OF
OPPOSITION, 1931 OCTOBER 11, AS SEEN IN AN INVERTING
TELESCOPE.



North

The central circle represents the planet.

GREENWICH MEAN TIME OF GREATEST ELONGATION.

ARIEL.			UMBRIEL.			TITANIA.		OBERON.
North.			North.			North.		North and South.
June 29 12.9	Aug. 31 13.0	Nov. 2 13.2	June 15 19.6	Sept. 27 10.0	June 1 05.2	July 25 01.2	N.	
July 2 01.4	Sept. 3 01.5	5 01.7	19 23.1	Oct. 1 13.5	9 22.1	31 18.7	S.	
4 13.8	5 13.9	7 14.2	24 02.5	5 16.9	18 15.0	Aug. 7 12.3	N.	
7 02.3	8 02.4	10 02.7	28 06.0	9 20.4	27 07.9	14 05.8	S.	
9 14.8	10 14.9	12 15.2	July 2 09.4	13 23.9	July 6 00.8	20 23.4	N.	
12 03.3	13 03.4	15 03.7	6 12.9	18 03.3	14 17.7	27 17.0	S.	
14 15.8	15 15.9	17 16.2	10 16.3	22 06.8	23 10.6	Sept. 3 10.6	N.	
17 04.2	18 04.4	20 04.7	14 19.8	26 10.3	Aug. 1 03.6	10 04.2	S.	
19 16.7	20 16.9	22 17.2	18 23.2	30 13.8	9 20.5	16 21.7	N.	
22 05.2	23 05.4	25 05.7	23 02.7	Nov. 3 17.2	18 13.4	23 15.3	S.	
24 17.7	25 17.9	27 18.2	27 06.1	7 20.7	27 06.4	30 08.9	N.	
27 06.2	28 06.4	30 06.7	31 09.6	12 00.2	Sept. 4 23.3	Oct. 7 02.5	S.	
29 18.7	30 18.8	Dec. 2 19.2	Aug. 4 13.0	16 03.6	13 16.3	13 20.1	N.	
Aug. 1 07.1	Oct. 3 07.3	5 07.7	8 16.5	20 07.1	22 09.2	20 13.7	S.	
3 19.6	5 19.8	7 20.2	12 19.9	24 10.6	Oct. 1 02.2	27 07.3	N.	
6 08.1	8 08.3	10 08.7	16 23.4	28 14.0	9 19.2	Nov. 3 00.9	S.	
8 20.6	10 20.8	12 21.2	21 02.8	Dec. 2 17.5	18 12.2	9 18.5	N.	
11 09.1	13 09.3	15 09.7	25 06.2	6 21.0	27 05.2	16 12.1	S.	
13 21.6	15 21.8	17 22.2	29 09.8	11 00.5	Nov. 4 22.1	23 05.7	N.	
16 10.1	18 10.3	20 10.6	Sept. 2 13.2	15 03.9	13 15.1	29 23.3	S.	
18 22.5	20 22.7	22 23.1	6 16.7	19 07.4	22 08.1	Dec. 6 16.9	N.	
21 11.0	23 11.3	25 11.6	10 20.2	23 10.9	Dec. 1 01.1	13 10.5	S.	
23 23.5	25 23.8	28 00.1	14 23.6	27 14.3	9 18.0	20 04.1	N.	
26 12.0	28 12.3	30 12.6	19 03.1	31 17.8	18 11.0	26 21.6	S.	
29 00.5	31 00.8	33 01.1	23 06.5	35 21.3	27 04.0	33 15.2	N.	

Sidereal period of Ariel, 2^d 12^h.489; of Umbriel, 4^d 03^h.460; of Titania, 8^d 16^h.941; of Oberon, 13^d 11^h.118.

SATELLITES OF URANUS, 1931.

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Time from Northern Elongation.	ARIEL.		UMBRIEL.		Time from Northern Elongation.	TITANIA.		Time from Northern Elongation.	OBERON.	
	p^1	F	p^1	F		p^1	F		p^1	F
d h	°		°		d h	°		d h	°	
0 00	346.0	1.000	346.0	1.000	0 00	346.0	1.000	0 00	346.0	1.000
0 02	339.9	0.984	342.3	0.995	0 05	341.6	0.992	0 08	341.5	0.991
0 04	333.4	0.937	338.6	0.976	0 10	337.1	0.967	0 16	336.8	0.964
0 06	326.1	0.864	334.6	0.948	0 15	332.3	0.927	1 00	331.7	0.922
0 08	317.1	0.770	330.4	0.908	0 20	326.9	0.873	1 08	326.1	0.864
0 10	305.4	0.668	325.7	0.860	1 01	320.7	0.808	1 16	319.6	0.796
0 12	289.7	0.575	320.4	0.805	1 06	313.4	0.736	2 00	311.7	0.720
0 14	269.1	0.515	314.4	0.744	1 11	304.5	0.662	2 08	302.0	0.644
0 16	245.7	0.511	307.2	0.682	1 16	293.4	0.593	2 16	289.8	0.576
0 18	224.6	0.565	298.5	0.622	1 21	279.6	0.538	3 00	274.9	0.526
0 20	208.3	0.656	288.2	0.568	2 02	263.6	0.508	3 08	257.7	0.505
0 22	196.2	0.758	275.9	0.528	2 07	246.6	0.510	3 16	240.4	0.519
1 00	186.9	0.853	262.2	0.507	2 12	230.8	0.543	4 00	224.9	0.564
1 02	179.4	0.930	247.9	0.508	2 17	217.3	0.599	4 08	212.2	0.630
1 04	172.8	0.980	234.3	0.533	2 22	206.5	0.670	4 16	202.0	0.705
1 06	166.7	1.000	222.3	0.575	3 03	197.7	0.744	5 00	193.9	0.781
1 08	160.7	0.988	212.2	0.630	3 08	190.6	0.815	5 08	187.1	0.852
1 10	154.3	0.945	203.8	0.690	3 13	184.5	0.879	5 16	181.3	0.911
1 12	147.0	0.874	196.8	0.753	3 18	179.2	0.932	6 00	176.2	0.957
1 14	138.3	0.783	190.8	0.813	3 23	174.4	0.970	6 08	171.4	0.987
1 16	127.0	0.681	185.6	0.867	4 04	169.9	0.993	6 16	166.9	1.000
1 18	111.8	0.585	181.0	0.914	4 09	165.5	1.000	7 00	162.4	0.994
1 20	91.8	0.520	176.8	0.952	4 14	161.2	0.990	7 08	157.7	0.971
1 22	68.6	0.508	172.9	0.980	4 19	156.6	0.963	7 16	152.8	0.931
2 00	46.9	0.556	169.2	0.996	5 00	151.7	0.921	8 00	147.2	0.876
2 02	30.0	0.644	165.5	1.000	5 05	146.3	0.866	8 08	140.9	0.810
2 04	17.5	0.746	161.8	0.992	5 10	140.0	0.800	8 16	133.4	0.735
2 06	8.0	0.843	158.1	0.973	5 15	132.6	0.728	9 00	124.1	0.659
2 08	0.3	0.922	154.1	0.943	5 20	123.4	0.654	9 08	112.4	0.588
2 10	353.6	0.975	149.8	0.902	6 01	112.0	0.586	9 16	98.0	0.534
2 12	347.5	0.999	145.0	0.853	6 06	98.0	0.534	10 00	81.2	0.506
2 14	341.4	0.991	139.7	0.797	6 11	81.8	0.507	10 08	63.7	0.514
2 16			133.5	0.736	6 16	64.9	0.512	10 16	47.7	0.553
2 18			126.1	0.674	6 21	49.2	0.548	11 00	34.4	0.616
2 20			117.2	0.614	7 02	36.1	0.607	11 08	23.8	0.690
2 22			106.6	0.562	7 07	25.5	0.677	11 16	15.3	0.767
3 00			94.1	0.524	7 12	16.9	0.752	12 00	8.3	0.838
3 02			80.3	0.506	7 17	9.9	0.822	12 08	2.4	0.901
3 04			66.0	0.510	7 22	3.9	0.885	12 16	357.1	0.950
3 06			52.6	0.537	8 03	358.7	0.936	13 00	352.3	0.983
3 08			40.9	0.582	8 08	353.9	0.973	13 08	347.8	0.999
3 10			31.0	0.638	8 13	349.4	0.995	13 16	343.3	0.997
3 12			22.8	0.699	8 18	345.1	1.000			
3 14			15.9	0.761						
3 16			10.1	0.820						
3 18			5.0	0.874						
3 20			0.4	0.920						
3 22			356.3	0.957						
4 00			352.4	0.982						
4 02			348.7	0.997						
4 04			345.0	1.000						

Position angle of satellite $p = p^1 + (P - P_0)$

Apparent distance of satellite $s = F \frac{a(p)}{p}$

SATELLITES OF URANUS, 1931.

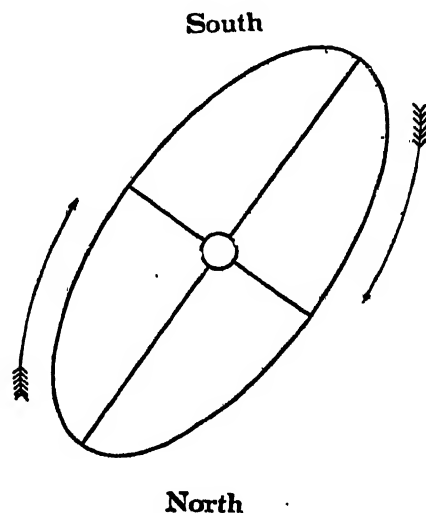
Date.	$P-P_0$	$\frac{a(\rho)}{\rho}$				Date.	$P-P_0$	$\frac{a(\rho)}{\rho}$			
		Ariel.	Um- briel.	Tit- ania.	Obe- ron.			Ariel.	Um- briel.	Tit- ania.	Obe- ron.
Jan. 1	-0.6	13.2	18.5	30.3	40.5	Sept. 7	+0.6	13.8	19.2	31.6	42.2
6	0.6	13.2	18.4	30.2	40.3	12	0.6	13.8	19.3	31.6	42.3
11	0.6	13.1	18.3	30.0	40.2	17	0.5	13.9	19.3	31.7	42.4
16	0.6	13.1	18.2	29.9	40.0	22	0.5	13.9	19.4	31.7	42.5
21	0.5	13.0	18.2	29.8	39.8	27	0.5	13.9	19.4	31.8	42.5
26	-0.5	13.0	18.1	29.7	39.7	Oct. 2	+0.4	13.9	19.4	31.8	42.6
31	0.5	12.9	18.0	29.6	39.5	7	0.4	13.9	19.4	31.8	42.6
Feb. 5	-0.5	12.9	18.0	29.4	39.4	12	0.3	13.9	19.4	31.8	42.6
10	0.5	13.0	18.1	29.5	39.5	17	0.3	13.9	19.4	31.8	42.6
June 24	+0.7	13.0	18.2	29.8	39.9	22	0.3	13.9	19.4	31.8	42.5
29	+0.7	13.1	18.2	29.9	40.0	Nov. 27	+0.2	13.9	19.4	31.8	42.5
July 4	0.7	13.2	18.3	30.1	40.2	1	0.2	13.9	19.3	31.7	42.4
9	0.7	13.2	18.4	30.2	40.4	6	0.2	13.9	19.3	31.7	42.4
14	0.7	13.3	18.5	30.3	40.5	11	0.1	13.8	19.3	31.6	42.3
19	0.7	13.3	18.6	30.4	40.7	16	0.1	13.8	19.2	31.5	42.2
24	+0.7	13.4	18.6	30.6	40.9	21	+0.1	13.8	19.2	31.4	42.0
Aug. 29	0.7	13.4	18.7	30.7	41.0	26	+0.1	13.7	19.1	31.3	41.9
3	0.7	13.5	18.8	30.8	41.2	Dec. 1	0.0	13.7	19.0	31.2	41.8
8	0.7	13.5	18.9	30.9	41.4	6	0.0	13.6	19.0	31.1	41.6
13	0.7	13.6	18.9	31.1	41.5	11	0.0	13.6	18.9	31.0	41.4
18	+0.7	13.6	19.0	31.2	41.7	16	0.0	13.5	18.8	30.9	41.3
23	0.7	13.7	19.1	31.3	41.8	21	0.0	13.4	18.7	30.7	41.1
28	0.7	13.7	19.1	31.4	42.0	26	0.0	13.4	18.7	30.6	40.9
Sept. 2	+0.6	13.8	19.2	31.5	42.1	31	0.0	13.3	18.6	30.5	40.8

SATELLITE OF NEPTUNE, 1931.

Time from East- ern Elong- ation.	ϕ^1	F	Time from East- ern Elong- ation.	ϕ^1	F	Date.	$P-P_0$	$\frac{a(\rho)}{\rho}$	Date.	$P-P_0$	$\frac{a(\rho)}{\rho}$
d h			d h			Jan. 1	+0.3	16.6	May 1	-1.2	16.5
0 00	146.0	1.000	3 00	324.2	0.998	6	0.3	16.6	6	1.3	16.4
0 03	142.4	0.993	3 03	320.6	0.985	11	0.2	16.6	11	1.3	16.4
0 06	138.8	0.972	3 06	316.9	0.957	16	0.2	16.7	16	1.3	16.3
0 09	134.9	0.938	3 09	312.8	0.917	21	+0.1	16.7	21	1.3	16.3
0 12	130.6	0.892	3 12	308.4	0.866	26	0.0	16.7	26	-1.3	16.2
0 15	125.9	0.836	3 15	303.3	0.805	31	0.0	16.7	31	1.2	16.2
0 18	120.4	0.771	3 18	297.3	0.737	Feb. 5	-0.1	16.8	June 5	-1.2	16.2
0 21	113.8	0.701	3 21	290.1	0.666	10	0.2	16.8	Oct. 22	+1.2	15.9
1 00	105.8	0.630	4 00	281.1	0.596	15	0.3	16.8	27	+1.3	15.9
1 03	95.7	0.563	4 03	269.9	0.534	20	-0.4	16.8	Nov. 1	1.4	16.0
1 06	83.2	0.507	4 06	256.2	0.487	25	0.4	16.8	6	1.4	16.0
1 09	68.3	0.472	4 09	240.3	0.465	Mar. 2	0.5	16.8	11	1.5	16.1
1 12	51.9	0.465	4 12	223.9	0.472	7	0.6	16.8	16	1.5	16.1
1 15	36.1	0.486	4 15	209.0	0.507	12	0.7	16.8	21	+1.6	16.2
1 18	22.3	0.533	4 18	196.4	0.562	17	-0.8	16.8	26	1.6	16.2
2 00	2.0	0.665	5 00	178.3	0.700	22	0.9	16.7	31	+1.6	16.3
2 03	354.8	0.736	5 03	171.7	0.770	27	0.9	16.7	Dec. 1	1.6	16.2
2 06	348.8	0.804	5 06	166.2	0.835	Apr. 1	1.0	16.7	6	1.6	16.3
2 09	343.7	0.865	5 09	161.4	0.892	6	1.1	16.7	11	1.6	16.3
2 12	339.2	0.916	5 12	157.2	0.938	11	-1.1	16.6	16	+1.6	16.4
2 15	335.2	0.957	5 15	153.3	0.972	16	1.2	16.6	21	1.6	16.4
2 18	331.4	0.984	5 18	149.6	0.993	21	1.2	16.5	26	1.6	16.5
2 21	327.8	0.998	5 21	146.1	1.000	26	-1.2	16.5	31	+1.6	16.5

Position angle of satellite $\phi = \phi^1 + (P - P_0)$ Apparent distance of satellite $s = \frac{a(\rho)}{\rho}$

APPARENT ORBIT OF THE SATELLITE OF NEPTUNE AT DATE OF
OPPOSITION, 1931 FEBRUARY 23, AS SEEN IN AN INVERTING
TELESCOPE.



The central circle represents the planet.

GREENWICH MEAN TIME OF GREATEST ELONGATION.

Jan.	d	h		Mar.	d	h		May	d	h		July	d	h		Nov.	d	h	
	1	19.8	E.		4	13.2	W.		5	06.7	E.		5	23.6	W.		3	09.6	E.
	4	18.3	W.		7	11.8	E.		8	05.2	W.		8	22.1	E.		6	08.1	W.
	7	16.9	E.		10	10.3	W.		11	03.8	E.		11	20.6	W.		9	06.6	E.
	10	15.4	W.		13	08.9	E.		14	02.3	W.		14	19.1	E.		12	05.1	W.
	13	13.9	E.		16	07.4	W.		17	00.8	E.		17	17.6	W.		15	03.6	E.
	16	12.5	W.		19	06.0	E.		19	23.4	W.		20	16.1	E.		18	02.1	W.
	19	11.0	E.		22	04.6	W.		22	21.9	E.		23	14.6	W.		21	00.6	E.
	22	09.5	W.		25	03.1	E.		25	20.4	W.		26	13.1	E.		23	23.1	W.
	25	08.1	E.		28	01.7	W.		28	18.9	E.		....				26	21.6	E.
	28	06.6	W.		31	00.2	E.		31	17.5	W.		Sept. 29	03.7	E.		29	20.1	W.
	31	05.2	E.		Apr. 2	22.8	W.		June 3	16.0	E.		Oct. 2	02.2	W.		Dec. 2	18.6	E.
Feb.	3	03.7	W.		5	21.3	E.		6	14.5	W.		5	00.7	E.		5	17.1	W.
	6	02.3	E.		8	19.9	W.		9	13.0	E.		7	23.1	W.		8	15.6	E.
	9	00.8	W.		11	18.4	E.		12	11.5	W.		10	21.6	E.		11	14.1	W.
	11	23.4	E.		14	16.9	W.		15	10.0	E.		13	20.1	W.		14	12.6	E.
	14	21.9	W.		17	15.5	E.		18	08.5	W.		16	18.6	E.		17	11.2	W.
	17	20.5	E.		20	14.0	W.		21	07.0	E.		19	17.1	W.		20	09.7	E.
	20	19.0	W.		23	12.6	E.		24	05.6	W.		22	15.6	E.		23	08.2	W.
	23	17.6	E.		26	11.1	W.		27	04.1	E.		25	14.1	W.		26	06.7	E.
	26	16.1	W.		29	09.6	E.		30	02.6	W.		28	12.6	E.		29	05.3	W.
Mar.	1	14.7	E.		May 2	08.2	W.		July 3	01.1	E.		31	11.1	W.		32	03.8	E.

The sidereal period of the satellite of Neptune is $5^d 21^h .044$.

	d	h		°			d	h		°		
Jan.	3		Earth in Perihelion				Apr.	24	01	21	♂	♂ .. 21 5 S.
	4	16	♂	♂	♂ .. 21 5 S.			25	19	♂	♂	♂ .. 21 3 S.
	5		♂	♂	♂			27	12	♂	♂	♂ .. 21 3 S.
	6		♂	Inf. ♂	♂			30		♂	Inf. ♂	♂
	6		♂	♂	♂		May	4		♂	Stationary	
	6	08	♂	♂	♂ .. 2.5 N.			7	11	♂	♂	♂ .. 21 5 N.
	6	15	♂	♂	♂ .. 0.6 S.			10	02	♂	♂	♂ .. 21 1.2 S.
	8	00	♂	♂	♂ .. 3 S.			13		♂	Stationary	
	14	23	♂	♂	♂ .. 8 N.			14	14	♂	♂	♂ .. 21 1 S.
	17		♂	Stationary				15		♂	Stationary	
	17	00	♂	♂	♂ .. 8 N.			15	02	♂	♂	♂ .. 21 3 S.
	17	18	♂	♂	♂ .. 5 N.			16	01	♂	♂	♂ .. 21 5 S.
	25	00	♂	♂	♂ .. 0.2 S.			21	14	♂	♂	♂ .. 21 5 S.
	27		♂	♂	♂			23	22	♂	♂	♂ .. 21 3 S.
	28		♂	at greatest elongation 25	W.			24	18	♂	♂	♂ .. 21 3 S.
	31	22	♂	♂	♂ .. 21 5 S.			27		♂	at greatest elongation 25	W.
Feb.	1	19	♂	♂	♂ .. 0.1 N.		June	3	19	♂	♂	♂ .. 21 5 N.
	2		♂	at greatest elongation 47	W.			11	00	♂	♂	♂ .. 21 1 S.
	2	11	♂	♂	♂ .. 0.3 S.			14	08	♂	♂	♂ .. 21 5 S.
	4	09	♂	♂	♂ .. 3 S.			14	21	♂	♂	♂ .. 21 6 S.
	13	08	♂	♂	♂ .. 8 N.			16	10	♂	♂	♂ .. 21 0.5 N.
	14	06	♂	♂	♂ .. 5 N.			18	05	♂	♂	♂ .. 21 5 S.
	15	15	♂	♂	♂ .. 4 N.			21	01	♂	♂	♂ .. 21 3 S.
	21	09	♂	♂	♂ .. 0.5 S.			21	05	♂	♂	♂ .. 21 2 S.
	23		♂	♂	♂			22	09	♂	♂	♂ .. 21 2 S.
	25	02	♂	♂	♂ .. 1.7 N.			29		♂	Sup. ♂	
	28	05	♂	♂	♂ .. 21 5 S.		July	1	00	♂	♂	♂ .. 21 5 N.
Mar.	1	10	♂	♂	♂ .. 1 S.			6		Earth in Aphelion		
	3	19	♂	♂	♂ .. 3 S.			8	10	♂	♂	♂ .. 21 2 S.
	7		♂	Stationary				9	20	♂	♂	♂ .. 21 1.5 N.
	9		♂	Stationary				13		♂	♂	♂ .. 21 0.8 S.
	13	16	♂	♂	♂ .. 6 N.			14	08	♂	♂	♂ .. 21 5 S.
	15		♂	Sup. ♂				16	00	♂	♂	♂ .. 21 4 S.
	15	05	♂	♂	♂ .. 6 N.			16	19	♂	♂	♂ .. 21 3 S.
	19	16	♂	♂	♂ .. 0.1 N.			18	09	♂	♂	♂ .. 21 2 S.
	20	18	♂	♂	♂ .. 0.7 S.			19	15	♂	♂	♂ .. 21 0.8 S.
	21	14	♂	♂	♂ .. 0.8 N.			25		♂	♂	♂ .. 21 0.8 S.
	26	07	♂	♂	♂ .. 0.8 N.			26		♂	Stationary	
	27	14	♂	♂	♂ .. 21 5 S.			28	04	♂	♂	♂ .. 21 5 N.
	28	22	♂	♂	♂ .. 2 S.			28	05	♂	♂	♂ .. 21 10' N.
	31	05	♂	♂	♂ .. 3 S.		Aug.	1	19	♂	♂	♂ .. 21 1.2 S.
Apr.	2		♂	eclipsed				4	18	♂	♂	♂ .. 21 2 S.
	6		♂	♂	♂			6	18	♂	♂	♂ .. 21 0.4 N.
	10		♂	at greatest elongation 19	E.			8		♂	at greatest elongation 27	E.
	10	02	♂	♂	♂ .. 6 N.			12	20	♂	♂	♂ .. 21 4 S.
	14	14	♂	♂	♂ .. 1 N.			13	07	♂	♂	♂ .. 21 3 S.
	17	04	♂	♂	♂ .. 0.9 S.			14	19	♂	♂	♂ .. 21 2 S.
	18		♂	eclipsed				15	14	♂	♂	♂ .. 21 5 S.
	19	09	♂	♂	♂ .. 0.4 N.			17	05	♂	♂	♂ .. 21 0.7 N.
	20		♂	Stationary				22		♂	Stationary	

d	h		d	h		d	h		d	h	
Aug. 24	07	♂ (.. ♀ 5 N.	Oct. 25	08	♂ (.. ♀ 2 S.	Oct. 25	08	♂ (.. ♀ 2 S.	Oct. 25	08	♂ (.. ♀ 2 S.
29		♂ (.. ♀ 5 N.	Nov. 4	00	♂ (.. ♀ 3 S.	Nov. 4	00	♂ (.. ♀ 3 S.	Nov. 4	00	♂ (.. ♀ 3 S.
31	18	♂ (.. ♀ 0.7 N.	5	06	♂ (.. ♀ 2 S.	5	06	♂ (.. ♀ 2 S.	5	06	♂ (.. ♀ 2 S.
Sept. 1	00	♂ (.. ♀ 2 S.	11	00	♂ (.. ♀ 3 N.	11	00	♂ (.. ♀ 3 N.	11	00	♂ (.. ♀ 3 N.
5		♂ Inf. ♂ (	11	05	♂ (.. ♀ 4 N.	11	05	♂ (.. ♀ 4 N.	11	05	♂ (.. ♀ 4 N.
8		♂ Sup. ♂ (	11	12	♂ (.. ♀ 4 N.	11	12	♂ (.. ♀ 4 N.	11	12	♂ (.. ♀ 4 N.
9	16	♂ (.. ♀ 4 S.	14	07	♂ (.. ♀ 5 N.	14	07	♂ (.. ♀ 5 N.	14	07	♂ (.. ♀ 5 N.
11	07	♂ (.. ♀ 5 S.	19	03	♂ (.. ♀ 0.1 N.	19	03	♂ (.. ♀ 0.1 N.	19	03	♂ (.. ♀ 0.1 N.
11	07	♂ (.. ♀ 2 S.	21	01	♂ (.. ♀ 1.6 S.	21	01	♂ (.. ♀ 1.6 S.	21	01	♂ (.. ♀ 1.6 S.
12		♂ eclipsed	21	13	♂ (.. ♀ 2 S.	21	13	♂ (.. ♀ 2 S.	21	13	♂ (.. ♀ 2 S.
12	06	♂ (.. ♀ 1' S.	Dec. 1	10	♂ (.. ♀ 3 S.	Dec. 1	10	♂ (.. ♀ 3 S.	Dec. 1	10	♂ (.. ♀ 3 S.
14		♂ Stationary	2	13	♂ (.. ♀ 2 S.	2	13	♂ (.. ♀ 2 S.	2	13	♂ (.. ♀ 2 S.
14	21	♂ (.. ♀ 2 N.	3		♂ at greatest elongation 21 E.	3		♂ at greatest elongation 21 E.	3		♂ at greatest elongation 21 E.
17	07	♂ (.. ♀ 0.9 S.	10		♂ Stationary	10		♂ Stationary	10		♂ Stationary
20	12	♂ (.. ♀ 5 N.	10	10	♂ (.. ♀ 4 N.	10	10	♂ (.. ♀ 4 N.	10	10	♂ (.. ♀ 4 N.
21		♂ at greatest elongation 18 W.	10	20	♂ (.. ♀ 4 N.	10	20	♂ (.. ♀ 4 N.	10	20	♂ (.. ♀ 4 N.
22		♂ Stationary	11	05	♂ (.. ♀ 4 N.	11	05	♂ (.. ♀ 4 N.	11	05	♂ (.. ♀ 4 N.
24	00	♂ enters Sign ♊, Equinox	11	21	♂ (.. ♀ 5 N.	11	21	♂ (.. ♀ 5 N.	11	21	♂ (.. ♀ 5 N.
26		♂ eclipsed	12		♂ Stationary	12		♂ Stationary	12		♂ Stationary
28	04	♂ (.. ♀ 2 S.	12		♂ Stationary	12		♂ Stationary	12		♂ Stationary
Oct. 7	10	♂ (.. ♀ 4 S.	16	05	♂ (.. ♀ 1.3 N.	16	05	♂ (.. ♀ 1.3 N.	16	05	♂ (.. ♀ 1.3 N.
8	20	♂ (.. ♀ 2 S.	18	20	♂ (.. ♀ 2 S.	18	20	♂ (.. ♀ 2 S.	18	20	♂ (.. ♀ 2 S.
11		♂ eclipsed	19	11	♂ (.. ♀ 1.5 S.	19	11	♂ (.. ♀ 1.5 S.	19	11	♂ (.. ♀ 1.5 S.
11		♂ ♂ (	21		♂ Inf. ♂ (	21		♂ Inf. ♂ (	21		♂ Inf. ♂ (
11	05	♂ (.. ♀ 2 N.	22	19	♂ enters Sign ♋, Solstice	22	19	♂ enters Sign ♋, Solstice	22	19	♂ enters Sign ♋, Solstice
12	06	♂ (.. ♀ 3 N.	26		♂ Stationary	26		♂ Stationary	26		♂ Stationary
13	16	♂ (.. ♀ 3 N.	28	15	♂ (.. ♀ 2 S.	28	15	♂ (.. ♀ 2 S.	28	15	♂ (.. ♀ 2 S.
17	19	♂ (.. ♀ 5 N.	29	19	♂ (.. ♀ 1 S.	29	19	♂ (.. ♀ 1 S.	29	19	♂ (.. ♀ 1 S.
18		♂ Sup. ♂ (	32		♂ Stationary	32		♂ Stationary	32		♂ Stationary

MERCURY ☿

Inferior Conjunction ..	Jan. 6	Apr. 30	Sept. 5	Dec. 21
Stationary ..	Jan. 17	May 13	Sept. 14	Dec. 32
Greatest Elongation W.	Jan. 28	May 27	Sept. 21	
Superior Conjunction ..	Mar. 15	June 29	Oct. 18	
Greatest Elongation E.	Apr. 10	Aug. 8	Dec. 3	
Stationary ..	Apr. 20	Aug. 22	Dec. 12	

VENUS ♀

Greatest Elongation W. ..	Feb. 2	Superior Conjunction ..	Sept. 8
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EARTH ⊕

Perihelion ..	Jan. 3	Equinoxes ..	Mar. 21 ^d 14 ^h	Sept. 24 ^d 00 ^h
Aphelion ..	July 6	Solstices ..	June 22 09	Dec. 22 19

SUPERIOR PLANETS.

	Conjunction ♂	Opposition ♂	Stationary
Mars ♂	.. —	Jan. 27	Mar. 9
Jupiter ♃	.. July 25	Jan. 6	Mar. 7
Saturn ♄	.. Jan. 5	July 13	May 4
Uranus ♅	.. Apr. 6	Oct. 11	July 26
Neptune ♆	.. Aug. 29	Feb. 23	May 15
			Dec. 12

LOCAL MEAN TIME OF SUNRISE (SUN'S UPPER LIMB), AND BEGINNING OF MORNING TWILIGHT, MERIDIAN OF GREENWICH, 1931.

To obtain the standard time at any station, increase the local time by the number of minutes the station is west of the standard meridian, or decrease the local time by the number of minutes the station is east of the standard meridian. For southern latitudes see page 658.

Lat. Date.		0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
Jan.	1	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
	2	05 59	06 17	06 35	06 56	07 08	07 22	07 38	07 59	08 08	08 19	08 32	08 46	09 03
	3	06 00	06 18	06 36	06 56	07 08	07 22	07 39	07 59	08 08	08 19	08 32	08 46	09 03
	4	06 01	06 18	06 36	06 57	07 09	07 22	07 39	07 59	08 08	08 19	08 31	08 46	09 02
	5	06 01	06 18	06 36	06 57	07 09	07 22	07 38	07 58	08 08	08 18	08 30	08 44	09 01
	6	06 02	06 19	06 36	06 57	07 09	07 22	07 38	07 58	08 08	08 18	08 30	08 44	09 00
	7	06 02	06 19	06 37	06 57	07 09	07 22	07 38	07 58	08 07	08 18	08 30	08 43	08 59
	8	06 03	06 19	06 37	06 57	07 09	07 22	07 38	07 58	08 07	08 17	08 29	08 42	08 58
	9	06 03	06 20	06 37	06 57	07 09	07 22	07 38	07 57	08 06	08 16	08 28	08 42	08 57
	10	06 04	06 20	06 37	06 57	07 09	07 22	07 38	07 57	08 06	08 16	08 28	08 41	08 56
	11	06 04	06 20	06 38	06 57	07 09	07 22	07 37	07 56	08 05	08 15	08 27	08 40	08 55
	12	06 04	06 20	06 38	06 57	07 09	07 22	07 37	07 56	08 05	08 14	08 26	08 39	08 54
	13	06 05	06 21	06 38	06 57	07 08	07 21	07 36	07 55	08 04	08 14	08 25	08 38	08 52
	14	06 05	06 21	06 38	06 57	07 08	07 21	07 36	07 54	08 03	08 13	08 24	08 36	08 51
	15	06 06	06 21	06 38	06 57	07 08	07 21	07 36	07 54	08 02	08 12	08 23	08 35	08 50
	16	06 06	06 21	06 38	06 57	07 08	07 20	07 35	07 53	08 02	08 11	08 22	08 34	08 48
	17	06 06	06 22	06 38	06 57	07 08	07 20	07 34	07 52	08 01	08 10	08 21	08 33	08 47
	18	06 07	06 22	06 38	06 56	07 07	07 19	07 34	07 51	08 00	08 09	08 19	08 31	08 45
	19	06 07	06 22	06 38	06 56	07 07	07 19	07 33	07 50	07 59	08 08	08 18	08 30	08 43
	20	06 07	06 22	06 38	06 56	07 06	07 18	07 32	07 49	07 58	08 06	08 17	08 28	08 42
	21	06 08	06 22	06 38	06 56	07 06	07 18	07 32	07 48	07 57	08 05	08 15	08 27	08 40
	22	06 08	06 22	06 38	06 56	07 06	07 17	07 31	07 47	07 56	08 04	08 14	08 25	08 38
	23	06 08	06 23	06 38	06 55	07 05	07 17	07 30	07 46	07 54	08 03	08 12	08 23	08 36
	24	06 08	06 23	06 38	06 55	07 05	07 16	07 29	07 45	07 53	08 01	08 11	08 22	08 34
	25	06 09	06 23	06 38	06 54	07 04	07 15	07 28	07 44	07 52	08 00	08 09	08 20	08 32
	26	06 09	06 23	06 37	06 54	07 04	07 15	07 28	07 43	07 50	07 59	08 08	08 18	08 30
	27	06 09	06 23	06 37	06 54	07 03	07 14	07 27	07 42	07 49	07 57	08 06	08 16	08 28
	28	06 09	06 23	06 37	06 53	07 02	07 13	07 26	07 41	07 48	07 56	08 04	08 14	08 26
	29	06 10	06 23	06 37	06 53	07 02	07 12	07 25	07 40	07 46	07 54	08 03	08 12	08 24
	30	06 10	06 23	06 36	06 52	07 01	07 12	07 24	07 38	07 45	07 52	08 01	08 10	08 21
Feb.	31	06 10	06 23	06 36	06 52	07 00	07 11	07 22	07 37	07 43	07 51	07 59	08 08	08 19
	1	06 10	06 23	06 36	06 51	07 00	07 10	07 21	07 35	07 42	07 49	07 57	08 06	08 17
	2	06 10	06 22	06 36	06 50	06 59	07 09	07 20	07 34	07 40	07 47	07 55	08 04	08 14
	3	06 10	06 22	06 35	06 50	06 58	07 08	07 19	07 32	07 39	07 46	07 53	08 02	08 12
	4	06 10	06 22	06 35	06 49	06 58	07 07	07 18	07 31	07 37	07 44	07 51	08 00	08 10
	5	06 10	06 22	06 35	06 49	06 57	07 06	07 17	07 30	07 36	07 42	07 49	07 58	08 07
	6	06 10	06 22	06 34	06 48	06 56	07 05	07 15	07 28	07 34	07 40	07 47	07 56	08 05
	7	06 11	06 22	06 34	06 47	06 55	07 04	07 14	07 26	07 32	07 38	07 45	07 53	08 02

BEGINNING OF MORNING TWILIGHT.

Jan.	I	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
	II	04 45	05 01	05 16	05 31	05 38	05 45	05 52	06 00	06 03	06 07	06 10	06 14	06 18
	21	04 50	05 06	05 20	05 33	05 39	05 45	05 52	05 59	06 02	06 05	06 08	06 11	06 15
Feb.	10	04 54	05 09	05 21	05 32	05 38	05 43	05 48	05 54	05 56	05 58	06 01	06 03	06 06
	31	04 58	05 10	05 20	05 30	05 34	05 38	05 41	05 45	05 46	05 47	05 49	05 50	05 51
	10	05 00	05 10	05 18	05 24	05 27	05 29	05 31	05 32	05 32	05 32	05 32	05 32	05 32

SUNSET, 1931.

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LOCAL MEAN TIME OF SUNSET (SUN'S UPPER LIMB), AND ENDING OF EVENING TWILIGHT, MERIDIAN OF GREENWICH, 1931.

To obtain the standard time at any station, increase the local time by the number of minutes the station is west of the standard meridian, or decrease the local time by the number of minutes the station is east of the standard meridian. For southern latitudes see page 658.

Lat.	Date.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
Jan.	1	18 07	17 50	17 32	17 11	16 59	16 45	16 28	16 08	15 58	15 48	15 35	15 21	15 04
	2	18 08	17 51	17 32	17 12	17 00	16 46	16 29	16 09	15 59	15 49	15 36	15 22	15 05
	3	18 08	17 51	17 33	17 12	17 00	16 46	16 30	16 10	16 00	15 50	15 38	15 24	15 07
	4	18 08	17 51	17 34	17 13	17 01	16 47	16 31	16 11	16 02	15 51	15 39	15 25	15 08
	5	18 09	17 52	17 34	17 14	17 02	16 48	16 32	16 12	16 03	15 52	15 40	15 26	15 10
	6	18 09	17 53	17 35	17 14	17 03	16 49	16 33	16 13	16 04	15 54	15 42	15 28	15 12
	7	18 10	17 53	17 36	17 15	17 04	16 50	16 34	16 14	16 05	15 55	15 43	15 30	15 14
	8	18 10	17 54	17 36	17 16	17 04	16 51	16 35	16 16	16 07	15 56	15 45	15 31	15 15
	9	18 11	17 54	17 37	17 17	17 05	16 52	16 36	16 17	16 08	15 58	15 46	15 33	15 17
	10	18 11	17 55	17 38	17 18	17 06	16 53	16 38	16 18	16 09	15 59	15 48	15 35	15 19
	11	18 12	17 55	17 38	17 18	17 07	16 54	16 39	16 20	16 11	16 01	15 50	15 36	15 21
	12	18 12	17 56	17 39	17 19	17 08	16 55	16 40	16 21	16 12	16 02	15 51	15 38	15 23
	13	18 12	17 56	17 39	17 20	17 09	16 56	16 41	16 22	16 14	16 04	15 53	15 40	15 26
	14	18 13	17 57	17 40	17 21	17 10	16 57	16 42	16 24	16 15	16 06	15 55	15 42	15 28
	15	18 13	17 57	17 41	17 22	17 11	16 58	16 43	16 25	16 17	16 07	15 56	15 44	15 30
	16	18 13	17 58	17 41	17 23	17 12	16 59	16 45	16 27	16 18	16 09	15 58	15 46	15 32
	17	18 14	17 58	17 42	17 24	17 13	17 00	16 46	16 28	16 20	16 11	16 00	15 48	15 34
	18	18 14	17 59	17 43	17 24	17 14	17 02	16 47	16 30	16 22	16 12	16 02	15 50	15 37
	19	18 14	17 59	17 43	17 25	17 15	17 03	16 49	16 31	16 23	16 14	16 04	15 52	15 39
	20	18 14	18 00	17 44	17 26	17 16	17 04	16 50	16 33	16 25	16 16	16 06	15 55	15 41
	21	18 15	18 00	17 45	17 27	17 17	17 05	16 51	16 34	16 26	16 18	16 08	15 57	15 44
	22	18 15	18 01	17 45	17 28	17 18	17 06	16 52	16 36	16 28	16 20	16 10	15 59	15 46
	23	18 16	18 01	17 46	17 29	17 19	17 07	16 54	16 38	16 30	16 22	16 12	16 01	15 49
	24	18 16	18 02	17 47	17 30	17 20	17 08	16 55	16 39	16 32	16 24	16 14	16 04	15 51
	25	18 16	18 02	17 47	17 30	17 21	17 10	16 57	16 41	16 34	16 25	16 16	16 06	15 54
	26	18 16	18 02	17 48	17 31	17 22	17 11	16 58	16 43	16 35	16 27	16 18	16 08	15 56
	27	18 16	18 03	17 48	17 32	17 23	17 12	16 59	16 44	16 37	16 29	16 20	16 10	15 59
	28	18 17	18 03	17 49	17 33	17 24	17 13	17 01	16 46	16 39	16 32	16 22	16 13	16 01
	29	18 17	18 04	17 50	17 34	17 25	17 14	17 02	16 48	16 41	16 33	16 24	16 15	16 04
	30	18 17	18 04	17 50	17 35	17 26	17 16	17 04	16 49	16 42	16 35	16 27	16 17	16 06
Feb.	31	18 17	18 04	17 51	17 36	17 27	17 17	17 05	16 51	16 44	16 37	16 29	16 20	16 09
	1	18 17	18 05	17 52	17 36	17 28	17 18	17 06	16 53	16 46	16 39	16 31	16 22	16 12
	2	18 17	18 05	17 52	17 37	17 29	17 19	17 08	16 54	16 48	16 41	16 33	16 24	16 14
	3	18 18	18 05	17 53	17 38	17 30	17 20	17 09	16 56	16 50	16 43	16 35	16 27	16 17
	4	18 18	18 06	17 53	17 39	17 31	17 22	17 11	16 58	16 52	16 45	16 38	16 29	16 20
	5	18 18	18 06	17 54	17 40	17 32	17 23	17 12	17 00	16 54	16 47	16 40	16 32	16 22
	6	18 18	18 06	17 54	17 41	17 33	17 24	17 14	17 01	16 55	16 49	16 42	16 34	16 25
	7	18 18	18 07	17 55	17 42	17 34	17 25	17 15	17 03	16 57	16 51	16 44	16 36	16 28

ENDING OF EVENING TWILIGHT.

Jan.	1	19 22	19 06	18 50	18 37	18 30	18 22	18 15	18 07	18 04	18 01	17 57	17 53	17 49
	11	19 26	19 10	18 56	18 44	18 37	18 31	18 24	18 17	18 14	18 12	18 08	18 05	18 02
	21	19 28	19 14	19 02	18 51	18 45	18 40	18 35	18 30	18 28	18 25	18 23	18 21	18 18
	31	19 29	19 17	19 07	18 58	18 54	18 50	18 47	18 44	18 42	18 41	18 40	18 39	18 38
Feb.	10	19 29	19 19	19 12	19 05	19 03	19 01	19 00	18 59	18 58	18 58	18 59	18 59	18 59

SUNRISE, 1931.

LOCAL MEAN TIME OF SUNRISE (SUN'S UPPER LIMB), AND BEGINNING OF MORNING TWILIGHT, MERIDIAN OF GREENWICH, 1931.

To obtain the standard time at any station, increase the local time by the number of minutes the station is west of the standard meridian, or decrease the local time by the number of minutes the station is east of the standard meridian. For southern latitudes see page 658.

Lat.		0°		+10°		+20°		+30°		+35°		+40°		+45°		+50°		+52°		+54°		+56°		+58°		+60°		
Date.																												
Feb.	7	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	
	8	06	11	06	22	06	34	06	47	06	55	07	04	07	14	07	26	07	32	07	38	07	45	07	53	08	02	
	9	06	11	06	22	06	33	06	47	06	54	07	03	07	13	07	25	07	30	07	36	07	43	07	51	08	00	
	10	06	11	06	22	06	33	06	46	06	53	07	02	07	11	07	23	07	28	07	34	07	41	07	49	07	57	
	11	06	11	06	21	06	32	06	45	06	52	07	00	07	10	07	22	07	27	07	33	07	39	07	46	07	55	
		06	11	06	21	06	32	06	44	06	51	06	59	07	09	07	20	07	25	07	31	07	37	07	44	07	52	
	12	06	11	06	21	06	32	06	44	06	50	06	58	07	07	07	18	07	23	07	28	07	35	07	42	07	49	
	13	06	11	06	21	06	31	06	43	06	49	06	57	07	06	07	16	07	21	07	26	07	32	07	39	07	47	
	14	06	11	06	20	06	30	06	42	06	48	06	56	07	07	04	07	15	07	19	07	24	07	30	07	37	07	44
	15	06	11	06	20	06	30	06	41	06	47	06	54	07	03	07	13	07	17	07	22	07	28	07	34	07	41	
	16	06	11	06	20	06	29	06	40	06	46	06	53	07	01	07	11	07	15	07	20	07	26	07	32	07	39	
	17	06	11	06	20	06	29	06	39	06	45	06	52	07	00	07	09	07	14	07	18	07	23	07	29	07	36	
	18	06	11	06	19	06	28	06	38	06	44	06	51	06	58	07	07	07	12	07	16	07	21	07	27	07	33	
	19	06	11	06	19	06	28	06	37	06	43	06	49	06	57	07	05	07	10	07	14	07	19	07	24	07	30	
	20	06	10	06	19	06	27	06	36	06	42	06	48	06	55	07	04	07	07	07	12	07	16	07	22	07	28	
	21	06	10	06	18	06	26	06	36	06	41	06	47	06	54	07	02	07	05	07	10	07	14	07	19	07	25	
22	06	10	06	18	06	26	06	35	06	40	06	45	06	52	07	00	07	03	07	07	07	12	07	17	07	22		
23	06	10	06	17	06	25	06	34	06	38	06	44	06	50	06	58	07	01	07	05	07	09	07	14	07	19		
24	06	10	06	17	06	24	06	33	06	37	06	42	06	48	06	56	06	59	07	03	07	07	07	11	07	16		
25	06	10	06	17	06	24	06	32	06	36	06	41	06	47	06	54	06	57	07	00	07	04	07	09	07	14		
26	06	10	06	16	06	23	06	30	06	35	06	40	06	45	06	52	06	55	06	58	07	02	07	06	07	11		
27	06	10	06	16	06	22	06	29	06	34	06	38	06	44	06	50	06	53	06	56	06	59	07	03	07	08		
28	06	09	06	15	06	22	06	28	06	32	06	37	06	42	06	48	06	51	06	54	06	57	07	01	07	05		
Mar.	1	06	09	06	15	06	21	06	27	06	31	06	35	06	40	06	46	06	48	06	51	06	54	06	58	07	02	
	2	06	09	06	14	06	20	06	26	06	30	06	34	06	38	06	44	06	46	06	49	06	52	06	55	06	59	
	3	06	09	06	14	06	19	06	25	06	28	06	32	06	37	06	42	06	44	06	47	06	49	06	53	06	56	
	4	06	09	06	14	06	18	06	24	06	27	06	31	06	35	06	40	06	42	06	44	06	47	06	50	06	53	
	5	06	08	06	13	06	18	06	23	06	26	06	29	06	33	06	38	06	40	06	42	06	44	06	47	06	50	
	6	06	08	06	12	06	17	06	22	06	25	06	28	06	31	06	36	06	37	06	40	06	42	06	44	06	47	
	7	06	08	06	12	06	16	06	21	06	23	06	26	06	30	06	33	06	35	06	37	06	39	06	42	06	44	
	8	06	08	06	12	06	15	06	20	06	22	06	25	06	28	06	31	06	33	06	35	06	37	06	39	06	41	
	9	06	08	06	11	06	14	06	18	06	20	06	23	06	26	06	29	06	30	06	32	06	34	06	36	06	38	
	10	06	07	06	10	06	14	06	17	06	19	06	21	06	24	06	27	06	28	06	30	06	31	06	33	06	35	
	11	06	07	06	10	06	13	06	16	06	18	06	20	06	22	06	25	06	26	06	27	06	29	06	30	06	32	
	12	06	07	06	09	06	12	06	15	06	16	06	18	06	20	06	23	06	24	06	25	06	26	06	28	06	29	
	13	06	06	06	09	06	11	06	14	06	15	06	17	06	18	06	20	06	21	06	22	06	24	06	25	06	26	
	14	06	06	06	08	06	10	06	13	06	14	06	15	06	17	06	18	06	19	06	20	06	21	06	22	06	23	
	15	06	06	06	08	06	09	06	11	06	12	06	14	06	15	06	16	06	17	06	18	06	18	06	19	06	20	

BEGINNING OF MORNING TWILIGHT.

	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
Jan. 31	04 58	05 10	05 20	05 30	05 34	05 38	05 41	05 45	05 46	05 47	05 49	05 50	05 51	
Feb. 10	05 00	05 10	05 18	05 24	05 27	05 29	05 31	05 32	05 32	05 32	05 32	05 32	05 32	
20	05 00	05 08	05 13	05 16	05 17	05 17	05 18	05 15	05 14	05 13	05 12	05 10	05 08	
Mar. 2	05 00	05 04	05 07	05 07	05 06	05 04	05 02	04 56	04 54	04 51	04 48	04 44	04 40	
12	04 58	05 00	04 59	04 56	04 52	04 48	04 43	04 35	04 31	04 26	04 21	04 15	04 08	
22	04 55	04 54	04 50	04 43	04 38	04 31	04 23	04 11	04 05	03 59	03 51	03 43	03 33	

SUNSET, 1931.

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LOCAL MEAN TIME OF SUNSET (SUN'S UPPER LIMB), AND ENDING OF EVENING TWILIGHT, MERIDIAN OF GREENWICH, 1931.

To obtain the standard time at any station, increase the local time by the number of minutes the station is west of the standard meridian, or decrease the local time by the number of minutes the station is east of the standard meridian. For southern latitudes see page 658.

Lat. Date.		0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
Feb.	7	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
	8	18 18	18 07	17 55	17 42	17 34	17 25	17 15	17 03	16 57	16 51	16 44	16 36	16 28
	9	18 18	18 07	17 55	17 42	17 35	17 26	17 16	17 05	16 59	16 53	16 46	16 39	16 30
	10	18 18	18 08	17 56	17 43	17 36	17 28	17 18	17 06	17 01	16 55	16 49	16 41	16 33
	11	18 18	18 08	17 57	17 44	17 37	17 29	17 19	17 08	17 03	16 57	16 51	16 44	16 35
	12	18 18	18 08	17 57	17 45	17 38	17 30	17 21	17 10	17 05	16 59	16 53	16 46	16 38
	13	18 18	18 08	17 58	17 46	17 39	17 31	17 22	17 12	17 07	17 01	16 55	16 48	16 41
	14	18 18	18 08	17 58	17 46	17 40	17 32	17 24	17 13	17 08	17 03	16 57	16 51	16 43
	15	18 18	18 08	17 58	17 47	17 41	17 34	17 25	17 15	17 10	17 05	17 00	16 53	16 46
	16	18 18	18 08	17 59	17 48	17 42	17 35	17 26	17 17	17 12	17 07	17 02	16 56	16 49
	17	18 18	18 09	17 59	17 49	17 43	17 36	17 28	17 18	17 14	17 09	17 04	16 58	16 51
	18	18 18	18 09	18 00	17 50	17 44	17 37	17 29	17 20	17 16	17 11	17 06	17 00	16 54
	19	18 18	18 09	18 00	17 50	17 45	17 38	17 31	17 22	17 18	17 13	17 08	17 03	16 56
	20	18 18	18 09	18 01	17 51	17 46	17 40	17 32	17 24	17 20	17 15	17 10	17 05	16 59
	21	18 17	18 10	18 01	17 52	17 47	17 41	17 34	17 25	17 22	17 17	17 13	17 07	17 02
	22	18 17	18 10	18 02	17 53	17 48	17 42	17 35	17 27	17 23	17 19	17 15	17 10	17 04
	23	18 17	18 10	18 02	17 53	17 48	17 43	17 36	17 29	17 25	17 21	17 17	17 12	17 07
	24	18 17	18 10	18 03	17 54	17 49	17 44	17 38	17 30	17 27	17 23	17 19	17 14	17 09
	25	18 17	18 10	18 03	17 55	17 50	17 45	17 39	17 32	17 29	17 25	17 21	17 17	17 12
	26	18 17	18 10	18 03	17 56	17 51	17 46	17 40	17 34	17 31	17 27	17 23	17 19	17 14
	27	18 17	18 10	18 04	17 56	17 52	17 47	17 42	17 35	17 32	17 29	17 26	17 22	17 17
	28	18 16	18 10	18 04	17 57	17 53	17 49	17 43	17 37	17 34	17 31	17 28	17 24	17 20
Mar.	1	18 16	18 10	18 04	17 58	17 54	17 50	17 44	17 39	17 36	17 33	17 30	17 26	17 22
	2	18 16	18 10	18 05	17 58	17 55	17 51	17 46	17 40	17 38	17 35	17 32	17 28	17 25
	3	18 16	18 11	18 05	17 59	17 56	17 52	17 47	17 42	17 40	17 37	17 34	17 31	17 27
	4	18 16	18 11	18 06	18 00	17 56	17 53	17 49	17 44	17 42	17 39	17 36	17 33	17 30
	5	18 15	18 11	18 06	18 00	17 57	17 54	17 50	17 45	17 43	17 41	17 38	17 35	17 32
	6	18 15	18 11	18 06	18 01	17 58	17 55	17 51	17 47	17 45	17 43	17 40	17 38	17 35
	7	18 15	18 11	18 07	18 02	17 59	17 56	17 53	17 49	17 47	17 45	17 43	17 40	17 37
	8	18 15	18 11	18 07	18 03	18 00	17 57	17 54	17 50	17 49	17 47	17 45	17 42	17 40
	9	18 14	18 11	18 07	18 03	18 01	17 58	17 55	17 52	17 50	17 49	17 47	17 45	17 42
	10	18 14	18 11	18 08	18 04	18 02	17 59	17 57	17 54	17 52	17 51	17 49	17 47	17 45
	11	18 14	18 11	18 08	18 04	18 02	18 00	17 58	17 55	17 54	17 52	17 51	17 49	17 47
	12	18 14	18 11	18 08	18 05	18 03	18 01	17 59	17 57	17 56	17 54	17 53	17 51	17 50
	13	18 13	18 11	18 08	18 06	18 04	18 02	18 01	17 58	17 57	17 56	17 55	17 54	17 52
	14	18 13	18 11	18 09	18 06	18 05	18 04	18 02	18 01	17 59	17 58	17 57	17 56	17 55
	15	18 13	18 11	18 09	18 07	18 06	18 05	18 03	18 02	18 01	18 00	17 59	17 58	17 57

ENDING OF EVENING TWILIGHT.

Jan.	31	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
	10	19 29	19 17	19 07	18 58	18 54	18 50	18 47	18 44	18 42	18 41	18 40	18 39	18 38
Feb.	20	19 29	19 19	19 12	19 05	19 03	19 01	19 00	18 59	18 58	18 58	18 59	18 59	18 59
	22	19 27	19 20	19 15	19 12	19 12	19 12	19 12	19 14	19 15	19 17	19 18	19 20	19 23
Mar.	2	19 25	19 21	19 19	19 19	19 20	19 22	19 26	19 30	19 33	19 36	19 39	19 43	19 48
	12	19 22	19 21	19 22	19 26	19 29	19 33	19 39	19 47	19 51	19 56	20 01	20 08	20 15
	22	19 19	19 21	19 25	19 32	19 38	19 45	19 54	20 06	20 11	20 18	20 26	20 35	20 46

SUNRISE, 1931.

LOCAL MEAN TIME OF SUNRISE (SUN'S UPPER LIMB), AND BEGINNING OF MORNING TWILIGHT, MERIDIAN OF GREENWICH, 1931.

To obtain the standard time at any station, increase the local time by the number of minutes the station is west of the standard meridian, or decrease the local time by the number of minutes the station is east of the standard meridian. For southern latitudes see page 658.

Lat. Date.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
Mar. 15	h m 06 06	h m 06 08	h m 06 09	h m 06 11	h m 06 12	h m 06 14	h m 06 15	h m 06 16	h m 06 17	h m 06 18	h m 06 18	h m 06 19	h m 06 20
16	06 06	06 07	06 09	06 10	06 11	06 12	06 13	06 14	06 15	06 15	06 16	06 16	06 17
17	06 05	06 06	06 08	06 09	06 10	06 10	06 11	06 12	06 12	06 13	06 13	06 14	06 14
18	06 05	06 06	06 07	06 08	06 08	06 09	06 09	06 10	06 10	06 11	06 11	06 11	06 11
19	06 05	06 05	06 06	06 07	06 07	06 07	06 07	06 08	06 08	06 08	06 08	06 08	06 08
20	06 04	06 05	06 05	06 05	06 05	06 06	06 05	06 05	06 05	06 05	06 05	06 05	06 05
21	06 04	06 04	06 04	06 04	06 04	06 04	06 04	06 03	06 03	06 03	06 03	06 02	06 02
22	06 04	06 04	06 03	06 03	06 03	06 02	06 02	06 01	06 01	06 00	06 00	06 00	05 59
23	06 04	06 03	06 02	06 02	06 01	06 01	06 00	05 59	05 58	05 58	05 57	05 57	05 56
24	06 03	06 02	06 02	06 00	06 00	05 59	05 58	05 57	05 56	05 55	05 55	05 54	05 53
25	06 03	06 02	06 01	05 59	05 58	05 57	05 56	05 54	05 54	05 53	05 52	05 51	05 50
26	06 03	06 01	06 00	05 58	05 57	05 56	05 54	05 52	05 52	05 50	05 50	05 48	05 47
27	06 02	06 01	05 59	05 57	05 56	05 54	05 52	05 50	05 49	05 48	05 47	05 46	05 44
28	06 02	06 00	05 58	05 56	05 54	05 52	05 50	05 48	05 47	05 46	05 44	05 43	05 41
29	06 02	06 00	05 57	05 54	05 53	05 51	05 48	05 46	05 44	05 43	05 41	05 40	05 38
30	06 02	05 59	05 56	05 53	05 51	05 49	05 47	05 44	05 42	05 41	05 39	05 37	05 35
31	06 01	05 58	05 56	05 52	05 50	05 48	05 45	05 41	05 40	05 38	05 36	05 34	05 32
Apr. 1	06 01	05 58	05 55	05 51	05 48	05 46	05 43	05 39	05 38	05 36	05 34	05 31	05 29
2	06 01	05 57	05 54	05 50	05 47	05 44	05 41	05 37	05 35	05 33	05 31	05 28	05 26
3	06 00	05 57	05 53	05 48	05 46	05 43	05 39	05 35	05 33	05 31	05 28	05 26	05 23
4	06 00	05 56	05 52	05 47	05 44	05 41	05 37	05 33	05 31	05 28	05 26	05 23	05 20
5	06 00	05 56	05 51	05 46	05 43	05 40	05 35	05 30	05 28	05 26	05 23	05 20	05 17
6	05 59	05 55	05 50	05 45	05 42	05 38	05 34	05 28	05 26	05 23	05 20	05 17	05 14
7	05 59	05 54	05 50	05 44	05 40	05 36	05 32	05 26	05 24	05 21	05 18	05 14	05 10
8	05 59	05 54	05 49	05 42	05 39	05 35	05 30	05 24	05 22	05 19	05 15	05 12	05 07
9	05 58	05 53	05 48	05 41	05 38	05 33	05 28	05 22	05 20	05 17	05 13	05 09	05 04
10	05 58	05 53	05 47	05 41	05 36	05 32	05 26	05 20	05 17	05 14	05 10	05 06	05 02
11	05 58	05 52	05 46	05 39	05 35	05 30	05 24	05 18	05 15	05 11	05 08	05 03	04 59
12	05 58	05 52	05 45	05 38	05 34	05 29	05 23	05 16	05 12	05 09	05 05	05 01	04 56
13	05 57	05 51	05 45	05 37	05 32	05 27	05 21	05 14	05 10	05 07	05 02	04 58	04 53
14	05 57	05 51	05 44	05 36	05 31	05 26	05 19	05 12	05 08	05 04	05 00	04 55	04 50
15	05 57	05 50	05 43	05 34	05 30	05 24	05 17	05 10	05 06	05 02	04 57	04 52	04 47
16	05 57	05 50	05 42	05 33	05 28	05 22	05 16	05 08	05 04	05 00	04 55	04 50	04 44
17	05 56	05 49	05 41	05 32	05 27	05 21	05 14	05 05	05 01	04 57	04 52	04 47	04 41
18	05 56	05 49	05 41	05 31	05 26	05 20	05 12	05 03	04 59	04 55	04 50	04 44	04 38
19	05 56	05 48	05 40	05 30	05 24	05 18	05 10	05 01	04 57	04 52	04 47	04 42	04 35
20	05 56	05 48	05 39	05 29	05 23	05 16	05 09	04 59	04 55	04 50	04 45	04 39	04 32
21	05 55	05 47	05 38	05 28	05 22	05 15	05 07	04 57	04 53	04 48	04 42	04 36	04 29

BEGINNING OF MORNING TWILIGHT.

Mar. 12	h m 04 58	h m 05 00	h m 04 59	h m 04 56	h m 04 52	h m 04 48	h m 04 43	h m 04 35	h m 04 31	h m 04 26	h m 04 21	h m 04 15	h m 04 08
22	04 55	04 54	04 50	04 43	04 38	04 31	04 23	04 11	04 05	03 59	03 51	03 43	03 33
Apr. 1	04 52	04 48	04 41	04 30	04 23	04 13	04 01	03 46	03 38	03 29	03 18	03 06	02 51
11	04 49	04 42	04 31	04 17	04 07	03 55	03 39	03 19	03 08	02 56	02 42	02 24	02 01
21	04 45	04 35	04 22	04 04	03 51	03 36	03 17	02 50	02 36	02 20	01 59	01 30	00 40

SUNSET, 1931.

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LOCAL MEAN TIME OF SUNSET (SUN'S UPPER LIMB), AND ENDING OF EVENING TWILIGHT, MERIDIAN OF GREENWICH, 1931.

To obtain the standard time at any station, increase the local time by the number of minutes the station is west of the standard meridian, or decrease the local time by the number of minutes the station is east of the standard meridian. For southern latitudes see page 658.

Lat. Date.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
Mar. 15	h m 18 13	h m 18 11	h m 18 10	h m 18 08	h m 18 07	h m 18 06	h m 18 05	h m 18 03	h m 18 03	h m 18 02	h m 18 01	h m 18 01	h m 18 00
16	h m 18 12	h m 18 11	h m 18 10	h m 18 08	h m 18 08	h m 18 07	h m 18 06	h m 18 05	h m 18 04	h m 18 04	h m 18 03	h m 18 03	h m 18 02
17	h m 18 12	h m 18 11	h m 18 10	h m 18 09	h m 18 08	h m 18 08	h m 18 07	h m 18 06	h m 18 06	h m 18 06	h m 18 05	h m 18 05	h m 18 04
18	h m 18 12	h m 18 11	h m 18 10	h m 18 10	h m 18 09	h m 18 09	h m 18 08	h m 18 08	h m 18 08	h m 18 08	h m 18 07	h m 18 07	h m 18 06
19	h m 18 12	h m 18 11	h m 18 11	h m 18 10	h m 18 10	h m 18 10	h m 18 10	h m 18 10	h m 18 10	h m 18 10	h m 18 10	h m 18 10	h m 18 09
20	h m 18 11	h m 18 11	h m 18 11	h m 18 11	h m 18 11	h m 18 11	h m 18 11	h m 18 11	h m 18 11	h m 18 12	h m 18 12	h m 18 12	h m 18 12
21	h m 18 11	h m 18 11	h m 18 11	h m 18 11	h m 18 12	h m 18 12	h m 18 12	h m 18 13	h m 18 13	h m 18 13	h m 18 14	h m 18 14	h m 18 14
22	h m 18 10	h m 18 11	h m 18 11	h m 18 12	h m 18 12	h m 18 13	h m 18 14	h m 18 14	h m 18 15	h m 18 15	h m 18 16	h m 18 16	h m 18 17
23	h m 18 10	h m 18 11	h m 18 12	h m 18 13	h m 18 13	h m 18 14	h m 18 15	h m 18 16	h m 18 16	h m 18 17	h m 18 18	h m 18 18	h m 18 19
24	h m 18 10	h m 18 11	h m 18 12	h m 18 13	h m 18 14	h m 18 15	h m 18 16	h m 18 18	h m 18 18	h m 18 19	h m 18 20	h m 18 21	h m 18 22
25	h m 18 10	h m 18 11	h m 18 12	h m 18 14	h m 18 15	h m 18 16	h m 18 17	h m 18 19	h m 18 20	h m 18 21	h m 18 22	h m 18 23	h m 18 24
26	h m 18 09	h m 18 11	h m 18 12	h m 18 14	h m 18 16	h m 18 17	h m 18 19	h m 18 21	h m 18 22	h m 18 23	h m 18 24	h m 18 25	h m 18 26
27	h m 18 09	h m 18 11	h m 18 13	h m 18 15	h m 18 16	h m 18 18	h m 18 20	h m 18 22	h m 18 23	h m 18 25	h m 18 26	h m 18 27	h m 18 29
28	h m 18 09	h m 18 11	h m 18 13	h m 18 16	h m 18 17	h m 18 19	h m 18 21	h m 18 24	h m 18 25	h m 18 26	h m 18 28	h m 18 30	h m 18 31
29	h m 18 08	h m 18 11	h m 18 13	h m 18 16	h m 18 18	h m 18 20	h m 18 22	h m 18 25	h m 18 27	h m 18 28	h m 18 30	h m 18 32	h m 18 34
30	h m 18 08	h m 18 11	h m 18 14	h m 18 17	h m 18 19	h m 18 21	h m 18 24	h m 18 27	h m 18 28	h m 18 30	h m 18 32	h m 18 34	h m 18 36
31	h m 18 08	h m 18 11	h m 18 14	h m 18 18	h m 18 20	h m 18 22	h m 18 25	h m 18 28	h m 18 30	h m 18 32	h m 18 34	h m 18 36	h m 18 39
Apr. 1	h m 18 08	h m 18 11	h m 18 14	h m 18 18	h m 18 20	h m 18 23	h m 18 26	h m 18 30	h m 18 32	h m 18 34	h m 18 36	h m 18 38	h m 18 41
2	h m 18 07	h m 18 10	h m 18 14	h m 18 19	h m 18 21	h m 18 24	h m 18 28	h m 18 32	h m 18 34	h m 18 36	h m 18 38	h m 18 41	h m 18 44
3	h m 18 07	h m 18 10	h m 18 15	h m 18 19	h m 18 22	h m 18 25	h m 18 29	h m 18 33	h m 18 35	h m 18 38	h m 18 40	h m 18 43	h m 18 46
4	h m 18 07	h m 18 10	h m 18 15	h m 18 20	h m 18 23	h m 18 26	h m 18 30	h m 18 35	h m 18 37	h m 18 40	h m 18 42	h m 18 45	h m 18 48
5	h m 18 06	h m 18 10	h m 18 15	h m 18 20	h m 18 24	h m 18 27	h m 18 31	h m 18 36	h m 18 39	h m 18 41	h m 18 44	h m 18 47	h m 18 51
6	h m 18 06	h m 18 10	h m 18 15	h m 18 21	h m 18 24	h m 18 28	h m 18 33	h m 18 38	h m 18 40	h m 18 43	h m 18 46	h m 18 50	h m 18 53
7	h m 18 06	h m 18 10	h m 18 16	h m 18 22	h m 18 25	h m 18 29	h m 18 34	h m 18 39	h m 18 42	h m 18 45	h m 18 48	h m 18 52	h m 18 56
8	h m 18 06	h m 18 10	h m 18 16	h m 18 22	h m 18 26	h m 18 30	h m 18 35	h m 18 41	h m 18 44	h m 18 47	h m 18 50	h m 18 54	h m 18 58
9	h m 18 05	h m 18 10	h m 18 16	h m 18 23	h m 18 27	h m 18 31	h m 18 36	h m 18 43	h m 18 46	h m 18 49	h m 18 52	h m 18 56	h m 19 01
10	h m 18 05	h m 18 10	h m 18 16	h m 18 24	h m 18 28	h m 18 32	h m 18 38	h m 18 44	h m 18 47	h m 18 50	h m 18 54	h m 18 58	h m 19 03
11	h m 18 05	h m 18 10	h m 18 17	h m 18 24	h m 18 28	h m 18 33	h m 18 39	h m 18 46	h m 18 49	h m 18 52	h m 18 56	h m 19 01	h m 19 06
12	h m 18 04	h m 18 10	h m 18 17	h m 18 25	h m 18 29	h m 18 34	h m 18 40	h m 18 47	h m 18 51	h m 18 54	h m 18 58	h m 19 03	h m 19 08
13	h m 18 04	h m 18 10	h m 18 17	h m 18 25	h m 18 30	h m 18 35	h m 18 42	h m 18 49	h m 18 52	h m 18 56	h m 19 00	h m 19 05	h m 19 10
14	h m 18 04	h m 18 10	h m 18 18	h m 18 26	h m 18 31	h m 18 36	h m 18 43	h m 18 50	h m 18 54	h m 18 58	h m 19 02	h m 19 07	h m 19 13
15	h m 18 04	h m 18 10	h m 18 18	h m 18 26	h m 18 32	h m 18 37	h m 18 44	h m 18 52	h m 18 56	h m 19 00	h m 19 04	h m 19 09	h m 19 15
16	h m 18 03	h m 18 10	h m 18 18	h m 18 27	h m 18 32	h m 18 38	h m 18 45	h m 18 54	h m 18 58	h m 19 02	h m 19 06	h m 19 12	h m 19 18
17	h m 18 03	h m 18 10	h m 18 18	h m 18 28	h m 18 33	h m 18 39	h m 18 46	h m 18 55	h m 18 59	h m 19 04	h m 19 08	h m 19 14	h m 19 20
18	h m 18 03	h m 18 10	h m 18 19	h m 18 28	h m 18 34	h m 18 40	h m 18 48	h m 18 57	h m 19 01	h m 19 05	h m 19 10	h m 19 16	h m 19 23
19	h m 18 03	h m 18 11	h m 18 19	h m 18 29	h m 18 35	h m 18 41	h m 18 49	h m 18 58	h m 19 03	h m 19 07	h m 19 12	h m 19 18	h m 19 25
20	h m 18 02	h m 18 11	h m 18 30	h m 18 36	h m 18 42	h m 18 50	h m 19 00	h m 19 04	h m 19 09	h m 19 14	h m 19 21	h m 19 28	h m 19 30
21	h m 18 02	h m 18 11	h m 18 30	h m 18 36	h m 18 43	h m 18 52	h m 19 01	h m 19 06	h m 19 11	h m 19 17	h m 19 23	h m 19 30	h m 19 30

ENDING OF EVENING TWILIGHT.

Mar. 12	h m 19 22	h m 19 21	h m 19 22	h m 19 26	h m 19 29	h m 19 33	h m 19 39	h m 19 47	h m 19 51	h m 19 56	h m 20 01	h m 20 08	h m 20 15
22	h m 19 19	h m 19 21	h m 19 25	h m 19 32	h m 19 38	h m 19 45	h m 19 54	h m 20 06	h m 20 11	h m 20 18	h m 20 26	h m 20 35	h m 20 46
Apr. 1	h m 19 16	h m 19 21	h m 19 28	h m 19 39	h m 19 47	h m 19 57	h m 20 09	h m 20 25	h m 20 33	h m 20 42	h m 20 53	h m 21 06	h m 21 21
11	h m 19 14	h m 19 21	h m 19 32	h m 19 47	h m 19 57	h m 20 09	h m 20 25	h m 20 46	h m 20 57	h m 21 10	h m 21 25	h m 21 43	h m 22 07
21	h m 19 12	h m 19 23	h m 19 36	h m 19 55	h m 20 07	h m 20 23	h m 20 43	h m 21 10	h m 21 25	h m 21 42	h m 22 04	h m 22 34	h m 23 37

LOCAL MEAN TIME OF SUNRISE (SUN'S UPPER LIMB), AND BEGINNING OF MORNING TWILIGHT, MERIDIAN OF GREENWICH, 1931.

To obtain the standard time at any station, increase the local time by the number of minutes the station is west of the standard meridian, or decrease the local time by the number of minutes the station is east of the standard meridian. For southern latitudes see page 658.

Lat.															
Date.		0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°	
Apr.	21	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	
	22	05 55	05 47	05 38	05 28	05 22	05 15	05 07	04 57	04 53	04 48	04 42	04 36	04 29	
	23	05 55	05 47	05 38	05 27	05 21	05 14	05 05	04 55	04 51	04 46	04 40	04 34	04 26	
	24	05 55	05 46	05 37	05 26	05 20	05 12	05 04	04 53	04 49	04 43	04 37	04 31	04 23	
	25	05 55	05 46	05 36	05 25	05 18	05 11	05 02	04 51	04 46	04 41	04 35	04 28	04 20	
	26	05 55	05 45	05 35	05 24	05 17	05 10	05 00	04 50	04 44	04 39	04 33	04 26	04 18	
	27	05 54	05 45	05 35	05 23	05 16	05 08	04 59	04 48	04 42	04 37	04 30	04 23	04 15	
	28	05 54	05 45	05 34	05 22	05 15	05 07	04 57	04 46	04 40	04 34	04 28	04 20	04 12	
	29	05 54	05 44	05 33	05 21	05 14	05 05	04 56	04 44	04 38	04 32	04 25	04 18	04 09	
	30	05 54	05 44	05 33	05 20	05 13	05 04	04 54	04 42	04 36	04 30	04 23	04 15	04 06	
	1	05 54	05 43	05 32	05 19	05 11	05 03	04 52	04 40	04 34	04 28	04 21	04 13	04 04	
May	2	05 54	05 43	05 31	05 17	05 09	05 00	04 50	04 37	04 30	04 24	04 16	04 08	03 58	
	3	05 54	05 42	05 30	05 16	05 08	04 59	04 48	04 35	04 29	04 22	04 14	04 05	03 55	
	4	05 53	05 42	05 30	05 16	05 07	04 58	04 46	04 33	04 27	04 20	04 12	04 03	03 53	
	5	05 53	05 42	05 29	05 15	05 06	04 57	04 45	04 31	04 25	04 18	04 10	04 00	03 50	
	6	05 53	05 41	05 28	05 14	05 05	04 55	04 44	04 30	04 23	04 16	04 07	03 58	03 47	
	7	05 53	05 41	05 28	05 13	05 04	04 54	04 42	04 28	04 21	04 14	04 05	03 56	03 45	
	8	05 53	05 41	05 28	05 12	05 03	04 53	04 41	04 26	04 19	04 12	04 03	03 53	03 42	
	9	05 53	05 40	05 27	05 11	05 02	04 52	04 40	04 25	04 18	04 10	04 01	03 51	03 40	
	10	05 53	05 40	05 26	05 11	05 01	04 51	04 38	04 23	04 16	04 08	03 59	03 49	03 37	
	11	05 53	05 40	05 26	05 10	05 00	04 50	04 37	04 22	04 14	04 06	03 57	03 46	03 34	
	12	05 53	05 40	05 26	05 09	05 00	04 49	04 36	04 20	04 12	04 04	03 55	03 44	03 32	
	13	05 53	05 40	05 26	05 09	04 59	04 48	04 34	04 18	04 11	04 02	03 53	03 42	03 29	
	14	05 53	05 39	05 25	05 08	04 58	04 47	04 33	04 17	04 09	04 01	03 51	03 40	03 27	
	15	05 53	05 39	05 24	05 07	04 57	04 46	04 32	04 16	04 08	03 59	03 49	03 38	03 25	
	16	05 53	05 39	05 24	05 07	04 56	04 45	04 31	04 14	04 06	03 57	03 47	03 36	03 22	
	17	05 53	05 39	05 24	05 06	04 56	04 44	04 30	04 13	04 05	03 56	03 45	03 34	03 20	
	18	05 53	05 38	05 23	05 05	04 55	04 43	04 29	04 11	04 03	03 54	03 44	03 32	03 18	
	19	05 53	05 38	05 23	05 05	04 54	04 42	04 28	04 10	04 02	03 52	03 42	03 30	03 16	
	20	05 53	05 38	05 22	05 04	04 54	04 41	04 27	04 09	04 00	03 51	03 40	03 28	03 13	
	21	05 53	05 38	05 22	05 04	04 53	04 40	04 26	04 08	03 59	03 49	03 38	03 26	03 11	
	22	05 53	05 38	05 22	05 03	04 52	04 40	04 25	04 06	03 58	03 48	03 37	03 24	03 09	
	23	05 53	05 38	05 22	05 03	04 52	04 39	04 24	04 05	03 56	03 46	03 35	03 22	03 07	
	24	05 53	05 38	05 21	05 02	04 51	04 38	04 23	04 04	03 55	03 45	03 34	03 20	03 05	
	25	05 53	05 38	05 21	05 02	04 50	04 38	04 22	04 03	03 54	03 44	03 32	03 19	03 03	
	26	05 53	05 38	05 21	05 01	04 50	04 37	04 21	04 02	03 53	03 42	03 31	03 17	03 01	
	27	05 53	05 38	05 21	05 01	04 50	04 36	04 20	04 01	03 52	03 41	03 29	03 15	02 59	
	28	05 53	05 38	05 20	05 01	04 49	04 36	04 20	04 00	03 51	03 40	03 28	03 14	02 57	

BEGINNING OF MORNING TWILIGHT.

Apr. 21	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
	04 45	04 35	04 22	04 04	03 51	03 36	03 17	02 50	02 36	02 20	01 59	01 30	00 40
	May 1	04 43	04 30	04 14	03 51	03 37	03 18	02 54	02 20	02 01	01 36	01 00	
	11	04 41	04 26	04 07	03 41	03 23	03 02	02 33	01 48	01 20	00 30		
21	04 40	04 23	04 01	03 26	03 12	02 47	02 13	01 13	00 02				
	31	04 40	04 21	03 57	03 26	03 04	02 36	01 56	00 23				

Twilight lasts all night at latitude +60°, Apr. 23-Aug. 22; +58°, Apr. 29-Aug. 16; +56°, May 6-Aug. 9; +54°, May 13-Aug. 2; +52°, May 22-July 24; +50°, June 2-July 12.

SUNSET, 1931.

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LOCAL MEAN TIME OF SUNSET (SUN'S UPPER LIMB), AND ENDING OF EVENING TWILIGHT, MERIDIAN OF GREENWICH, 1931.

To obtain the standard time at any station, increase the local time by the number of minutes the station is west of the standard meridian, or decrease the local time by the number of minutes the station is east of the standard meridian. For southern latitudes see page 658.

Lat. Date.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
Apr. 21	18 02	18 11	18 20	18 30	18 36	18 43	18 52	19 01	19 06	19 11	19 17	19 23	19 30
22	18 02	18 11	18 20	18 31	18 37	18 44	18 53	19 03	19 08	19 13	19 19	19 25	19 33
23	18 02	18 11	18 20	18 31	18 38	18 45	18 54	19 04	19 09	19 15	19 21	19 27	19 35
24	18 02	18 11	18 21	18 32	18 39	18 46	18 55	19 06	19 11	19 17	19 23	19 30	19 38
25	18 02	18 11	18 21	18 33	18 40	18 47	18 57	19 08	19 13	19 18	19 25	19 32	19 40
26	18 01	18 11	18 21	18 33	18 40	18 48	18 58	19 09	19 14	19 20	19 27	19 34	19 42
27	18 01	18 11	18 22	18 34	18 41	18 49	18 59	19 11	19 16	19 22	19 29	19 36	19 45
28	18 01	18 11	18 22	18 35	18 42	18 50	19 00	19 12	19 18	19 24	19 31	19 39	19 47
29	18 01	18 11	18 22	18 35	18 43	18 51	19 02	19 14	19 19	19 26	19 33	19 41	19 50
30	18 01	18 11	18 23	18 36	18 44	18 52	19 03	19 15	19 21	19 28	19 35	19 43	19 52
May 1	18 01	18 12	18 23	18 37	18 44	18 53	19 04	19 17	19 23	19 30	19 37	19 45	19 55
2	18 00	18 12	18 23	18 37	18 45	18 54	19 05	19 18	19 24	19 31	19 39	19 48	19 57
3	18 00	18 12	18 24	18 38	18 46	18 55	19 07	19 20	19 26	19 33	19 41	19 50	20 00
4	18 00	18 12	18 24	18 38	18 47	18 56	19 08	19 21	19 28	19 35	19 43	19 52	20 02
5	18 00	18 12	18 25	18 39	18 48	18 57	19 09	19 23	19 30	19 37	19 45	19 54	20 05
6	18 00	18 12	18 25	18 40	18 49	18 58	19 10	19 24	19 31	19 39	19 47	19 56	20 07
7	18 00	18 12	18 25	18 40	18 49	18 59	19 12	19 26	19 33	19 40	19 49	19 58	20 10
8	18 00	18 12	18 26	18 41	18 50	19 00	19 13	19 28	19 34	19 42	19 51	20 01	20 12
9	18 00	18 12	18 26	18 42	18 51	19 01	19 14	19 29	19 36	19 44	19 53	20 03	20 15
10	18 00	18 13	18 26	18 42	18 52	19 02	19 15	19 30	19 38	19 46	19 55	20 05	20 17
11	18 00	18 13	18 27	18 43	18 53	19 03	19 16	19 32	19 39	19 48	19 57	20 07	20 20
12	18 00	18 13	18 27	18 44	18 53	19 04	19 17	19 33	19 41	19 49	19 59	20 09	20 22
13	18 00	18 13	18 28	18 44	18 54	19 05	19 19	19 35	19 42	19 51	20 01	20 12	20 24
14	18 00	18 13	18 28	18 45	18 55	19 06	19 20	19 36	19 44	19 53	20 02	20 14	20 27
15	18 00	18 14	18 28	18 46	18 56	19 07	19 21	19 38	19 46	19 54	20 04	20 16	20 29
16	18 00	18 14	18 29	18 46	18 56	19 08	19 22	19 39	19 47	19 56	20 06	20 18	20 31
17	18 00	18 14	18 29	18 47	18 57	19 09	19 23	19 40	19 49	19 58	20 08	20 20	20 34
18	18 00	18 14	18 30	18 48	18 58	19 10	19 24	19 42	19 50	19 59	20 09	20 22	20 36
19	18 00	18 14	18 30	18 48	18 59	19 11	19 25	19 43	19 52	20 01	20 12	20 24	20 38
20	18 00	18 15	18 30	18 49	19 00	19 12	19 26	19 44	19 53	20 03	20 14	20 26	20 40
21	18 00	18 15	18 31	18 49	19 00	19 13	19 28	19 46	19 55	20 04	20 15	20 28	20 43
22	18 00	18 15	18 31	18 50	19 01	19 14	19 29	19 47	19 56	20 06	20 17	20 30	20 45
23	18 00	18 15	18 32	18 51	19 02	19 15	19 30	19 48	19 57	20 07	20 19	20 32	20 47
24	18 00	18 16	18 32	18 51	19 02	19 15	19 31	19 50	19 59	20 09	20 20	20 34	20 49
25	18 00	18 16	18 32	18 52	19 03	19 16	19 32	19 51	20 00	20 10	20 22	20 36	20 52
26	18 00	18 16	18 33	18 52	19 04	19 17	19 33	19 52	20 02	20 12	20 24	20 37	20 54
27	18 00	18 16	18 33	18 53	19 05	19 18	19 34	19 53	20 03	20 13	20 25	20 39	20 56
28	18 01	18 17	18 34	18 54	19 05	19 19	19 35	19 55	20 04	20 15	20 27	20 41	20 58

ENDING OF EVENING TWILIGHT.

	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m
Apr. 21	19	12	19	23	19	36	19	55	20	07	20	23	20	43	21	10
May 1	19	12	19	25	19	41	20	04	20	19	20	37	21	02	21	37
11	19	12	19	27	19	47	20	13	20	30	20	52	21	22	22	08
21	19	13	19	31	19	52	20	22	20	41	21	07	21	42	22	44
31	19	15	19	34	19	58	20	30	20	51	21	20	22	01	23	42

Twilight lasts all night at latitude +60°, Apr. 23-Aug. 22; +58°, Apr. 29-Aug. 16; +56°, May 6-Aug. 9; +54°, May 13-Aug. 2; +52°, May 22-July 24; +50°, June 2-July 12.

LOCAL MEAN TIME OF SUNRISE (SUN'S UPPER LIMB), AND BEGINNING OF MORNING TWILIGHT, MERIDIAN OF GREENWICH, 1931.

To obtain the standard time at any station, increase the local time by the number of minutes the station is west of the standard meridian, or decrease the local time by the number of minutes the station is east of the standard meridian. For southern latitudes see page 658.

Lat.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
Date.	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
May 28	05 53	05 38	05 20	05 01	04 49	04 36	04 20	04 00	03 51	03 40	03 28	03 14	02 57
29	05 54	05 38	05 20	05 00	04 49	04 35	04 19	03 59	03 50	03 39	03 27	03 12	02 56
30	05 54	05 38	05 20	05 00	04 48	04 35	04 18	03 58	03 49	03 38	03 25	03 11	02 54
31	05 54	05 38	05 20	05 00	04 48	04 34	04 18	03 57	03 48	03 37	03 24	03 10	02 52
June 1	05 54	05 38	05 20	04 59	04 47	04 34	04 17	03 56	03 47	03 36	03 23	03 08	02 50
2	05 54	05 38	05 20	04 59	04 47	04 33	04 16	03 56	03 46	03 35	03 22	03 07	02 49
3	05 54	05 38	05 20	04 59	04 47	04 33	04 16	03 55	03 45	03 34	03 21	03 06	02 48
4	05 54	05 38	05 20	04 59	04 46	04 32	04 16	03 54	03 44	03 33	03 20	03 05	02 46
5	05 54	05 38	05 20	04 59	04 46	04 32	04 15	03 54	03 44	03 32	03 19	03 04	02 45
6	05 55	05 38	05 20	04 58	04 46	04 32	04 15	03 53	03 43	03 31	03 18	03 03	02 44
7	05 55	05 38	05 20	04 58	04 46	04 31	04 14	03 53	03 42	03 31	03 17	03 02	02 43
8	05 55	05 38	05 20	04 58	04 46	04 31	04 14	03 52	03 42	03 30	03 16	03 01	02 42
9	05 55	05 38	05 20	04 58	04 46	04 31	04 14	03 52	03 41	03 30	03 16	03 00	02 41
10	05 55	05 38	05 20	04 58	04 45	04 31	04 13	03 51	03 41	03 29	03 15	02 59	02 40
11	05 56	05 38	05 20	04 58	04 45	04 31	04 13	03 51	03 40	03 28	03 15	02 58	02 39
12	05 56	05 38	05 20	04 58	04 45	04 30	04 13	03 51	03 40	03 28	03 14	02 58	02 38
13	05 56	05 39	05 20	04 58	04 45	04 30	04 13	03 50	03 40	03 28	03 14	02 57	02 37
14	05 56	05 39	05 20	04 58	04 45	04 30	04 12	03 50	03 40	03 27	03 13	02 57	02 37
15	05 56	05 39	05 20	04 58	04 45	04 30	04 12	03 50	03 39	03 27	03 13	02 56	02 36
16	05 56	05 39	05 20	04 58	04 45	04 30	04 12	03 50	03 39	03 27	03 13	02 56	02 36
17	05 57	05 39	05 20	04 58	04 45	04 30	04 12	03 50	03 39	03 27	03 13	02 56	02 36
18	05 57	05 40	05 20	04 59	04 45	04 30	04 12	03 50	03 39	03 27	03 12	02 56	02 35
19	05 57	05 40	05 21	04 59	04 46	04 30	04 13	03 50	03 39	03 27	03 12	02 56	02 35
20	05 57	05 40	05 21	04 59	04 46	04 31	04 13	03 50	03 39	03 27	03 12	02 56	02 35
21	05 58	05 40	05 21	04 59	04 46	04 31	04 13	03 50	03 39	03 27	03 13	02 56	02 35
22	05 58	05 40	05 21	04 59	04 46	04 31	04 13	03 50	03 39	03 27	03 13	02 56	02 35
23	05 58	05 40	05 22	04 59	04 46	04 31	04 13	03 51	03 40	03 27	03 13	02 56	02 36
24	05 58	05 41	05 22	05 00	04 46	04 31	04 13	03 51	03 40	03 28	03 13	02 56	02 36
25	05 58	05 41	05 22	05 00	04 47	04 32	04 14	03 51	03 40	03 28	03 14	02 57	02 36
26	05 59	05 41	05 22	05 00	04 47	04 32	04 14	03 52	03 41	03 28	03 14	02 57	02 37
27	05 59	05 41	05 22	05 00	04 48	04 32	04 14	03 52	03 41	03 29	03 15	02 58	02 38
28	05 59	05 42	05 23	05 01	04 48	04 33	04 15	03 52	03 42	03 29	03 15	02 58	02 38
29	05 59	05 42	05 23	05 01	04 48	04 33	04 15	03 53	03 42	03 30	03 16	02 59	02 39
30	06 00	05 42	05 23	05 01	04 48	04 34	04 16	03 53	03 43	03 30	03 16	03 00	02 40
July 1	06 00	05 42	05 24	05 02	04 49	04 34	04 16	03 54	03 43	03 31	03 17	03 01	02 41
2	06 00	05 43	05 24	05 02	04 49	04 34	04 17	03 55	03 44	03 32	03 18	03 02	02 42
3	06 00	05 43	05 24	05 02	04 50	04 35	04 17	03 55	03 45	03 33	03 19	03 03	02 43

BEGINNING OF MORNING TWILIGHT.

	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
May 21	04 40	04 23	04 01	03 32	03 12	02 47	02 13	01 13	00 02				
31	04 40	04 21	03 57	03 26	03 04	02 36	01 56	00 23					
June 10	04 41	04 21	03 56	03 22	02 59	02 29	01 43						
20	04 42	04 22	03 57	03 22	02 59	02 27	01 39						
30	04 45	04 25	03 59	03 25	03 02	02 31	01 44						
July 10	04 47	04 28	04 04	03 31	03 09	02 39	01 56						

Twilight lasts all night at latitude +60°, Apr. 23-Aug. 22; +58°, Apr. 29-Aug. 16; +56°, May 6-Aug. 9; +54°, May 13-Aug. 2; +52°, May 22-July 24; +50°, June 2-July 12.

SUNSET, 1931.

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LOCAL MEAN TIME OF SUNSET (SUN'S UPPER LIMB), AND ENDING OF EVENING TWILIGHT, MERIDIAN OF GREENWICH, 1931.

To obtain the standard time at any station, increase the local time by the number of minutes the station is west of the standard meridian, or decrease the local time by the number of minutes the station is east of the standard meridian. For southern latitudes see page 658.

Lat.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
Date.													
May 28	h m 18 01	h m 18 17	h m 18 34	h m 18 54	h m 19 05	h m 19 19	h m 19 35	h m 19 55	h m 20 04	h m 20 15	h m 20 27	h m 20 41	h m 20 58
29	h m 18 01	h m 18 17	h m 18 34	h m 18 54	h m 19 06	h m 19 20	h m 19 36	h m 19 56	h m 20 05	h m 20 16	h m 20 28	h m 20 43	h m 21 00
30	h m 18 01	h m 18 17	h m 18 34	h m 18 55	h m 19 07	h m 19 20	h m 19 36	h m 19 57	h m 20 06	h m 20 17	h m 20 30	h m 20 44	h m 21 02
31	h m 18 01	h m 18 17	h m 18 35	h m 18 55	h m 19 07	h m 19 21	h m 19 37	h m 19 58	h m 20 08	h m 20 19	h m 20 31	h m 20 46	h m 21 04
June 1	h m 18 01	h m 18 18	h m 18 35	h m 18 56	h m 19 08	h m 19 22	h m 19 38	h m 19 59	h m 20 09	h m 20 20	h m 20 33	h m 20 48	h m 21 05
2	h m 18 01	h m 18 18	h m 18 36	h m 18 56	h m 19 08	h m 19 22	h m 19 39	h m 20 00	h m 20 10	h m 20 21	h m 20 34	h m 20 49	h m 21 07
3	h m 18 01	h m 18 18	h m 18 36	h m 18 56	h m 19 09	h m 19 23	h m 19 40	h m 20 01	h m 20 11	h m 20 22	h m 20 35	h m 20 50	h m 21 09
4	h m 18 02	h m 18 18	h m 18 36	h m 18 57	h m 19 10	h m 19 24	h m 19 41	h m 20 02	h m 20 12	h m 20 24	h m 20 37	h m 20 52	h m 21 10
5	h m 18 02	h m 18 18	h m 18 37	h m 18 58	h m 19 10	h m 19 24	h m 19 42	h m 20 03	h m 20 13	h m 20 25	h m 20 38	h m 20 53	h m 21 12
6	h m 18 02	h m 18 19	h m 18 37	h m 18 58	h m 19 11	h m 19 25	h m 19 42	h m 20 04	h m 20 14	h m 20 26	h m 20 39	h m 20 55	h m 21 14
7	h m 18 02	h m 18 19	h m 18 38	h m 18 59	h m 19 11	h m 19 26	h m 19 43	h m 20 05	h m 20 15	h m 20 27	h m 20 40	h m 20 56	h m 21 15
8	h m 18 02	h m 18 20	h m 18 38	h m 18 59	h m 19 12	h m 19 26	h m 19 44	h m 20 06	h m 20 16	h m 20 28	h m 20 41	h m 20 57	h m 21 16
9	h m 18 02	h m 18 20	h m 18 38	h m 19 00	h m 19 12	h m 19 27	h m 19 44	h m 20 06	h m 20 17	h m 20 29	h m 20 42	h m 20 58	h m 21 18
10	h m 18 03	h m 18 20	h m 18 38	h m 19 00	h m 19 13	h m 19 28	h m 19 45	h m 20 07	h m 20 18	h m 20 30	h m 20 43	h m 20 59	h m 21 19
11	h m 18 03	h m 18 20	h m 18 39	h m 19 01	h m 19 13	h m 19 28	h m 19 46	h m 20 08	h m 20 18	h m 20 30	h m 20 44	h m 21 01	h m 21 20
12	h m 18 03	h m 18 20	h m 18 39	h m 19 01	h m 19 14	h m 19 29	h m 19 46	h m 20 08	h m 20 19	h m 20 31	h m 20 45	h m 21 02	h m 21 21
13	h m 18 03	h m 18 21	h m 18 40	h m 19 01	h m 19 14	h m 19 29	h m 19 47	h m 20 09	h m 20 20	h m 20 32	h m 20 46	h m 21 02	h m 21 22
14	h m 18 04	h m 18 21	h m 18 40	h m 19 02	h m 19 15	h m 19 30	h m 19 47	h m 20 10	h m 20 20	h m 20 33	h m 20 47	h m 21 03	h m 21 23
15	h m 18 04	h m 18 21	h m 18 40	h m 19 02	h m 19 15	h m 19 30	h m 19 48	h m 20 10	h m 20 21	h m 20 33	h m 20 47	h m 21 04	h m 21 24
16	h m 18 04	h m 18 22	h m 18 40	h m 19 02	h m 19 15	h m 19 30	h m 19 48	h m 20 11	h m 20 22	h m 20 34	h m 20 48	h m 21 05	h m 21 25
17	h m 18 04	h m 18 22	h m 18 41	h m 19 03	h m 19 16	h m 19 31	h m 19 49	h m 20 11	h m 20 22	h m 20 34	h m 20 49	h m 21 05	h m 21 26
18	h m 18 04	h m 18 22	h m 18 41	h m 19 03	h m 19 16	h m 19 31	h m 19 49	h m 20 12	h m 20 22	h m 20 35	h m 20 49	h m 21 06	h m 21 26
19	h m 18 05	h m 18 22	h m 18 41	h m 19 03	h m 19 16	h m 19 31	h m 19 49	h m 20 12	h m 20 23	h m 20 35	h m 20 50	h m 21 06	h m 21 27
20	h m 18 05	h m 18 22	h m 18 41	h m 19 04	h m 19 17	h m 19 32	h m 19 50	h m 20 12	h m 20 23	h m 20 36	h m 20 50	h m 21 07	h m 21 27
21	h m 18 05	h m 18 23	h m 18 42	h m 19 04	h m 19 17	h m 19 32	h m 19 50	h m 20 12	h m 20 24	h m 20 36	h m 20 50	h m 21 07	h m 21 28
22	h m 18 05	h m 18 23	h m 18 42	h m 19 04	h m 19 17	h m 19 32	h m 19 50	h m 20 13	h m 20 24	h m 20 36	h m 20 50	h m 21 07	h m 21 28
23	h m 18 05	h m 18 23	h m 18 42	h m 19 04	h m 19 17	h m 19 32	h m 19 50	h m 20 13	h m 20 24	h m 20 36	h m 20 50	h m 21 07	h m 21 28
24	h m 18 06	h m 18 23	h m 18 42	h m 19 04	h m 19 17	h m 19 32	h m 19 50	h m 20 13	h m 20 24	h m 20 36	h m 20 51	h m 21 07	h m 21 28
25	h m 18 06	h m 18 24	h m 18 42	h m 19 04	h m 19 18	h m 19 32	h m 19 50	h m 20 13	h m 20 24	h m 20 36	h m 20 51	h m 21 07	h m 21 28
26	h m 18 06	h m 18 24	h m 18 43	h m 19 05	h m 19 18	h m 19 33	h m 19 51	h m 20 13	h m 20 24	h m 20 36	h m 20 51	h m 21 07	h m 21 28
27	h m 18 06	h m 18 24	h m 18 43	h m 19 05	h m 19 18	h m 19 33	h m 19 51	h m 20 13	h m 20 24	h m 20 36	h m 20 50	h m 21 07	h m 21 28
28	h m 18 06	h m 18 24	h m 18 43	h m 19 05	h m 19 18	h m 19 33	h m 19 51	h m 20 13	h m 20 24	h m 20 36	h m 20 50	h m 21 07	h m 21 27
29	h m 18 07	h m 18 24	h m 18 43	h m 19 05	h m 19 18	h m 19 33	h m 19 50	h m 20 13	h m 20 24	h m 20 36	h m 20 50	h m 21 07	h m 21 27
30	h m 18 07	h m 18 24	h m 18 43	h m 19 05	h m 19 18	h m 19 33	h m 19 50	h m 20 13	h m 20 24	h m 20 36	h m 20 50	h m 21 06	h m 21 26
July 1	h m 18 07	h m 18 24	h m 18 43	h m 19 05	h m 19 18	h m 19 33	h m 19 50	h m 20 13	h m 20 24	h m 20 35	h m 20 49	h m 21 06	h m 21 26
2	h m 18 07	h m 18 25	h m 18 43	h m 19 05	h m 19 18	h m 19 33	h m 19 50	h m 20 12	h m 20 23	h m 20 35	h m 20 49	h m 21 05	h m 21 25
3	h m 18 08	h m 18 25	h m 18 43	h m 19 05	h m 19 18	h m 19 32	h m 19 50	h m 20 12	h m 20 23	h m 20 35	h m 20 48	h m 21 05	h m 21 24

ENDING OF EVENING TWILIGHT.

	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
May 21	19 13	19 31	19 52	20 22	20 41	21 07	21 42	22 44					
31	19 15	19 34	19 58	20 30	20 51	21 20	22 01	23 42					
June 10	19 18	19 37	20 02	20 36	20 59	21 30	22 16						
20	19 20	19 40	20 06	20 40	21 04	21 35	22 23						
30	19 22	19 42	20 07	20 41	21 04	21 35	22 22						
July 10	19 23	19 42	20 06	20 39	21 01	21 30	22 13						

Twilight lasts all night at latitude +60°, Apr. 23-Aug. 22; +58°, Apr. 29-Aug. 16; +56°, May 6-Aug. 9; +54°, May 13-Aug. 2; +52°, May 22-July 24; +50°, June 2-July 12.

LOCAL MEAN TIME OF SUNRISE (SUN'S UPPER LIMB), AND BEGINNING OF MORNING TWILIGHT, MERIDIAN OF GREENWICH, 1931.

To obtain the standard time at any station, increase the local time by the number of minutes the station is west of the standard meridian, or decrease the local time by the number of minutes the station is east of the standard meridian. For southern latitudes see page 658.

Lat.	Date.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
		<small>h m</small>	<small>h m</small>	<small>h m</small>	<small>h m</small>	<small>h m</small>	<small>h m</small>	<small>h m</small>	<small>h m</small>	<small>h m</small>	<small>h m</small>	<small>h m</small>	<small>h m</small>	<small>h m</small>
July	3	06 00	05 43	05 24	05 02	04 50	04 35	04 17	03 55	03 45	03 33	03 19	03 03	02 43
	4	06 00	05 43	05 25	05 03	04 50	04 36	04 18	03 56	03 45	03 34	03 20	03 04	02 44
	5	06 00	05 43	05 25	05 03	04 51	04 36	04 19	03 57	03 46	03 34	03 21	03 05	02 45
	6	06 01	05 44	05 25	05 04	04 51	04 37	04 19	03 58	03 47	03 35	03 22	03 06	02 46
	7	06 01	05 44	05 26	05 04	04 52	04 37	04 20	03 58	03 48	03 36	03 23	03 07	02 48
	8	06 01	05 44	05 26	05 05	04 52	04 38	04 21	03 59	03 49	03 37	03 24	03 08	02 49
	9	06 01	05 44	05 26	05 05	04 53	04 38	04 21	04 00	03 50	03 38	03 25	03 10	02 51
	10	06 01	05 45	05 27	05 06	04 53	04 39	04 22	04 01	03 51	03 39	03 26	03 11	02 52
	11	06 02	05 45	05 27	05 06	04 54	04 40	04 23	04 02	03 52	03 40	03 27	03 12	02 54
	12	06 02	05 45	05 27	05 07	04 54	04 40	04 24	04 03	03 53	03 42	03 29	03 14	02 56
	13	06 02	05 45	05 28	05 07	04 55	04 41	04 24	04 04	03 54	03 43	03 30	03 15	02 57
	14	06 02	05 46	05 28	05 08	04 56	04 42	04 25	04 05	03 55	03 44	03 32	03 17	02 59
	15	06 02	05 46	05 28	05 08	04 56	04 43	04 26	04 06	03 56	03 45	03 33	03 18	03 01
	16	06 02	05 46	05 29	05 09	04 57	04 43	04 27	04 07	03 58	03 47	03 34	03 20	03 03
	17	06 02	05 46	05 29	05 09	04 58	04 44	04 28	04 08	03 59	03 48	03 36	03 22	03 05
	18	06 02	05 47	05 30	05 10	04 58	04 45	04 29	04 09	04 00	03 49	03 37	03 24	03 07
	19	06 02	05 47	05 30	05 10	04 59	04 46	04 30	04 10	04 01	03 51	03 39	03 25	03 09
	20	06 02	05 47	05 30	05 11	05 00	04 46	04 31	04 12	04 02	03 52	03 41	03 27	03 11
	21	06 03	05 47	05 31	05 12	05 00	04 47	04 32	04 13	04 04	03 54	03 42	03 29	03 13
	22	06 03	05 48	05 31	05 12	05 01	04 48	04 33	04 14	04 05	03 55	03 44	03 31	03 15
	23	06 03	05 48	05 32	05 13	05 02	04 49	04 34	04 15	04 07	03 57	03 45	03 33	03 17
	24	06 03	05 48	05 32	05 13	05 02	04 50	04 35	04 17	04 08	03 58	03 47	03 34	03 20
	25	06 03	05 48	05 32	05 14	05 03	04 51	04 36	04 18	04 09	04 00	03 49	03 36	03 22
	26	06 03	05 48	05 33	05 14	05 04	04 52	04 37	04 19	04 11	04 01	03 51	03 38	03 24
	27	06 03	05 48	05 33	05 15	05 05	04 52	04 38	04 20	04 12	04 03	03 52	03 40	03 26
	28	06 03	05 49	05 33	05 16	05 05	04 53	04 39	04 22	04 14	04 05	03 54	03 42	03 28
	29	06 03	05 49	05 34	05 16	05 06	04 54	04 40	04 23	04 15	04 06	03 56	03 44	03 31
	30	06 03	05 49	05 34	05 17	05 07	04 55	04 42	04 25	04 17	04 08	03 58	03 46	03 33
	31	06 03	05 49	05 34	05 18	05 08	04 56	04 43	04 26	04 18	04 10	04 00	03 48	03 35
Aug.	1	06 03	05 49	05 35	05 18	05 08	04 57	04 44	04 27	04 20	04 11	04 01	03 51	03 38
	2	06 03	05 50	05 35	05 19	05 09	04 58	04 45	04 29	04 21	04 13	04 03	03 53	03 40
	3	06 03	05 50	05 36	05 19	05 10	04 59	04 46	04 30	04 23	04 15	04 05	03 55	03 42
	4	06 03	05 50	05 36	05 20	05 10	05 00	04 47	04 32	04 24	04 16	04 07	03 57	03 45
	5	06 02	05 50	05 36	05 20	05 11	05 01	04 48	04 33	04 26	04 18	04 09	03 59	03 47
	6	06 02	05 50	05 36	05 21	05 12	05 02	04 50	04 34	04 28	04 20	04 11	04 01	03 50
	7	06 02	05 50	05 37	05 22	05 13	05 03	04 51	04 36	04 29	04 21	04 13	04 03	03 52
	8	06 02	05 50	05 37	05 22	05 14	05 04	04 52	04 37	04 31	04 23	04 15	04 05	03 54
	9	06 02	05 50	05 38	05 23	05 14	05 05	04 53	04 39	04 32	04 25	04 17	04 08	03 57

BEGINNING OF MORNING TWILIGHT.

	<small>h m</small>	<small>h m</small>	<small>h m</small>	<small>h m</small>	<small>h m</small>	<small>h m</small>	<small>h m</small>	<small>h m</small>	<small>h m</small>	<small>h m</small>	<small>h m</small>	<small>h m</small>	<small>h m</small>	<small>h m</small>
June 30	04 45	04 25	03 59	03 25	03 02	02 31	01 44							
July 10	04 47	04 28	04 03	31 03	09 02	39 01	56							
20	04 49	04 31	04 09	03 38	03 18	02 51	02 14	01 04						
30	04 50	04 34	04 14	03 46	03 28	03 05	02 33	01 43	01 07					
Aug. 9	04 50	04 36	04 19	03 55	03 39	03 20	02 52	02 15	01 53	01 20				

Twilight lasts all night at latitude +60°, Apr. 23-Aug. 22; +58°, Apr. 29-Aug. 16; +56°, May 6-Aug. 9; +54°, May 13-Aug. 2; +52°, May 22-July 24; +50°, June 2-July 12.

SUNSET, 1931.

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LOCAL MEAN TIME OF SUNSET (SUN'S UPPER LIMB), AND ENDING OF EVENING TWILIGHT, MERIDIAN OF GREENWICH, 1931.

To obtain the standard time at any station, increase the local time by the number of minutes the station is west of the standard meridian, or decrease the local time by the number of minutes the station is east of the standard meridian. For southern latitudes see page 658.

Lat.	Date.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
July	3	18 08	18 25	18 43	19 05	19 18	19 32	19 50	20 12	20 23	20 35	20 48	21 05	21 24
	4	18 08	18 25	18 43	19 05	19 18	19 32	19 50	20 12	20 22	20 34	20 48	21 04	21 24
	5	18 08	18 25	18 43	19 05	19 18	19 32	19 50	20 11	20 22	20 34	20 47	21 03	21 23
	6	18 08	18 25	18 43	19 05	19 17	19 32	19 49	20 11	20 21	20 33	20 47	21 02	21 22
	7	18 08	18 25	18 43	19 05	19 17	19 32	19 49	20 10	20 21	20 32	20 46	21 01	21 20
	8	18 08	18 25	18 43	19 04	19 17	19 31	19 48	20 10	20 20	20 32	20 45	21 00	21 19
	9	18 08	18 25	18 43	19 04	19 17	19 31	19 48	20 09	20 19	20 31	20 44	20 59	21 18
	10	18 09	18 25	18 43	19 04	19 16	19 31	19 48	20 09	20 19	20 30	20 43	20 58	21 17
	11	18 09	18 25	18 43	19 04	19 16	19 30	19 47	20 08	20 18	20 29	20 42	20 57	21 16
	12	18 09	18 25	18 43	19 04	19 16	19 30	19 46	20 07	20 17	20 28	20 41	20 56	21 14
	13	18 09	18 25	18 43	19 03	19 16	19 29	19 46	20 06	20 16	20 27	20 40	20 55	21 12
	14	18 09	18 25	18 43	19 03	19 15	19 29	19 45	20 06	20 15	20 26	20 39	20 53	21 11
	15	18 09	18 25	18 43	19 03	19 15	19 28	19 45	20 05	20 14	20 25	20 38	20 52	21 09
	16	18 09	18 25	18 42	19 02	19 14	19 28	19 44	20 04	20 13	20 24	20 36	20 51	21 08
	17	18 09	18 25	18 42	19 02	19 14	19 27	19 43	20 03	20 12	20 23	20 35	20 49	21 06
	18	18 09	18 25	18 42	19 02	19 13	19 27	19 42	20 02	20 11	20 22	20 34	20 47	21 04
	19	18 10	18 25	18 42	19 01	19 13	19 26	19 42	20 01	20 10	20 20	20 32	20 46	21 02
	20	18 10	18 25	18 42	19 01	19 12	19 25	19 41	20 00	20 09	20 19	20 31	20 44	21 00
	21	18 10	18 25	18 41	19 00	19 12	19 25	19 40	19 59	20 08	20 18	20 29	20 42	20 58
	22	18 10	18 25	18 41	19 00	19 11	19 24	19 39	19 58	20 06	20 16	20 28	20 41	20 56
	23	18 10	18 25	18 41	18 59	19 10	19 23	19 38	19 56	20 05	20 15	20 26	20 39	20 54
	24	18 10	18 24	18 40	18 59	19 10	19 22	19 37	19 55	20 04	20 13	20 24	20 37	20 52
	25	18 10	18 24	18 40	18 58	19 09	19 21	19 36	19 54	20 02	20 12	20 23	20 35	20 50
	26	18 10	18 24	18 40	18 58	19 08	19 21	19 35	19 53	20 01	20 10	20 21	20 33	20 48
	27	18 10	18 24	18 39	18 57	19 08	19 20	19 34	19 51	20 00	20 09	20 19	20 31	20 45
	28	18 10	18 24	18 39	18 56	19 07	19 19	19 33	19 50	19 58	20 07	20 18	20 29	20 43
	29	18 10	18 24	18 39	18 56	19 06	19 18	19 32	19 49	19 56	20 05	20 16	20 27	20 40
	30	18 10	18 23	18 38	18 55	19 05	19 17	19 30	19 47	19 55	20 04	20 14	20 25	20 38
	31	18 10	18 23	18 38	18 55	19 04	19 16	19 29	19 46	19 54	20 02	20 12	20 23	20 36
Aug.	1	18 10	18 23	18 37	18 54	19 04	19 15	19 28	19 44	19 52	20 00	20 10	20 21	20 33
	2	18 09	18 23	18 37	18 53	19 03	19 14	19 27	19 43	19 50	19 58	20 08	20 18	20 31
	3	18 09	18 22	18 36	18 52	19 02	19 13	19 26	19 41	19 48	19 57	20 06	20 16	20 28
	4	18 09	18 22	18 36	18 52	19 01	19 12	19 24	19 40	19 47	19 55	20 04	20 14	20 26
	5	18 09	18 22	18 35	18 51	19 00	19 10	19 23	19 38	19 45	19 53	20 02	20 12	20 23
	6	18 09	18 22	18 35	18 50	18 59	19 09	19 21	19 36	19 43	19 51	20 00	20 09	20 21
	7	18 09	18 21	18 34	18 49	18 58	19 08	19 20	19 35	19 41	19 49	19 58	20 07	20 18
	8	18 09	18 21	18 34	18 48	18 57	19 07	19 19	19 33	19 40	19 47	19 55	20 05	20 15
	9	18 09	18 20	18 33	18 48	18 56	19 06	19 17	19 31	19 38	19 45	19 53	20 02	20 13

ENDING OF EVENING TWILIGHT.

	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m			
June 30	19 22	19 42	20 07	20 41	21 04	21 35	22 22								
July 10	19 23	19 42	20 06	20 39	21 01	21 30	22 13								
20	19 23	19 41	20 03	20 34	20 54	21 20	21 57	23 04							
30	19 22	19 38	19 58	20 25	20 43	21 06	21 38	22 26	23 00						
Aug. 9	19 20	19 34	19 51	20 15	20 30	20 50	21 16	21 53	22 15	22 45					

Twilight lasts all night at latitude +60°, Apr. 23-Aug. 22; +58°, Apr. 29-Aug. 16; +56°, May 6-Aug. 9; +54°, May 13-Aug. 2; +52°, May 22-July 24; +50°, June 2-July 12.

LOCAL MEAN TIME OF SUNRISE (SUN'S UPPER LIMB), AND BEGINNING OF MORNING TWILIGHT, MERIDIAN OF GREENWICH, 1931.

To obtain the standard time at any station, increase the local time by the number of minutes the station is west of the standard meridian, or decrease the local time by the number of minutes the station is east of the standard meridian. For southern latitudes see page 658.

Lat.														
Date.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°	
Aug.	9	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	
	10	06 02	05 50	05 38	05 23	05 14	05 05	04 53	04 39	04 32	04 25	04 17	04 08	
	11	06 02	05 50	05 38	05 24	05 15	05 06	04 54	04 40	04 34	04 27	04 19	04 10	
	12	06 02	05 50	05 38	05 24	05 16	05 06	04 55	04 42	04 36	04 28	04 21	04 12	
	13	06 02	05 51	05 38	05 25	05 17	05 07	04 57	04 43	04 37	04 30	04 23	04 14	
	14	06 02	05 51	05 39	05 25	05 17	05 08	04 58	04 45	04 39	04 32	04 24	04 16	
	15	06 01	05 51	05 39	05 26	05 18	05 09	04 59	04 47	04 40	04 34	04 26	04 18	
	16	06 01	05 51	05 40	05 26	05 19	05 10	05 00	04 48	04 42	04 36	04 28	04 20	
	17	06 01	05 51	05 40	05 27	05 20	05 11	05 01	04 49	04 44	04 37	04 30	04 22	
	18	06 01	05 51	05 40	05 28	05 20	05 12	05 02	04 51	04 45	04 39	04 32	04 25	
	19	06 00	05 51	05 41	05 29	05 22	05 14	05 05	04 54	04 48	04 43	04 36	04 29	
	20	06 00	05 51	05 41	05 29	05 23	05 15	05 06	04 55	04 50	04 44	04 38	04 31	
	21	06 00	05 51	05 41	05 30	05 23	05 16	05 07	04 57	04 52	04 46	04 40	04 33	
	22	06 00	05 51	05 42	05 31	05 24	05 17	05 08	04 58	04 53	04 48	04 42	04 36	
	23	05 59	05 51	05 42	05 31	05 25	05 18	05 10	05 00	04 55	04 50	04 44	04 38	
	24	05 59	05 51	05 42	05 32	05 26	05 19	05 11	05 01	04 57	04 52	04 46	04 40	
	25	05 59	05 51	05 42	05 32	05 26	05 20	05 12	05 03	04 58	04 53	04 48	04 42	
	26	05 59	05 51	05 42	05 33	05 27	05 21	05 13	05 04	05 00	04 55	04 50	04 44	
	27	05 58	05 51	05 43	05 33	05 28	05 22	05 14	05 06	05 02	04 57	04 52	04 46	
	28	05 58	05 51	05 43	05 34	05 29	05 23	05 16	05 07	05 03	04 59	04 54	04 48	
	Sept.	29	05 58	05 51	05 43	05 34	05 29	05 24	05 17	05 08	05 05	05 00	04 56	04 51
		30	05 58	05 51	05 44	05 35	05 30	05 24	05 18	05 10	05 06	05 02	04 58	04 53
		31	05 57	05 51	05 44	05 36	05 31	05 25	05 19	05 12	05 08	05 04	04 50	04 50
		1	05 57	05 51	05 44	05 36	05 32	05 26	05 20	05 13	05 10	05 06	05 02	04 57
2		05 57	05 51	05 44	05 37	05 32	05 27	05 22	05 14	05 11	05 08	05 04	04 59	
3		05 56	05 51	05 44	05 37	05 33	05 28	05 23	05 16	05 13	05 09	05 06	05 01	
4		05 56	05 51	05 45	05 38	05 34	05 29	05 24	05 18	05 14	05 11	05 08	05 04	
5		05 56	05 50	05 45	05 38	05 34	05 30	05 25	05 19	05 16	05 13	05 10	05 06	
6		05 55	05 50	05 45	05 39	05 35	05 31	05 26	05 20	05 18	05 15	05 12	05 08	
7		05 55	05 50	05 45	05 40	05 36	05 32	05 28	05 22	05 19	05 17	05 14	05 10	
8		05 55	05 50	05 46	05 40	05 37	05 33	05 29	05 24	05 21	05 18	05 15	05 12	
9		05 54	05 50	05 46	05 41	05 38	05 34	05 30	05 25	05 23	05 20	05 17	05 14	
10		05 54	05 50	05 46	05 41	05 38	05 35	05 31	05 26	05 24	05 22	05 19	05 16	
11		05 54	05 50	05 46	05 42	05 39	05 36	05 32	05 28	05 26	05 24	05 21	05 19	
12		05 53	05 50	05 46	05 42	05 40	05 37	05 34	05 29	05 28	05 26	05 23	05 21	
13	05 53	05 50	05 47	05 43	05 40	05 38	05 35	05 31	05 29	05 27	05 25	05 23		
14	05 53	05 50	05 47	05 43	05 41	05 39	05 36	05 32	05 31	05 29	05 27	05 25		
15	05 52	05 50	05 47	05 44	05 42	05 40	05 37	05 34	05 32	05 31	05 29	05 27		

BEGINNING OF MORNING TWILIGHT.

	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
Aug. 9	04 50	04 36	04 19	03 55	03 39	03 20	02 52	02 15	01 53	01 20	h m	h m	h m	h m
19	04 50	04 39	04 24	04 04	03 50	03 34	03 12	02 42	02 26	02 07	01 40	00 56		
29	04 48	04 40	04 28	04 11	04 00	03 47	03 29	03 06	02 54	02 40	02 23	02 02	01 31	
Sept. 8	04 46	04 40	04 31	04 19	04 10	03 59	03 46	03 28	03 19	03 08	02 56	02 41	02 23	
18	04 42	04 40	04 34	04 25	04 19	04 11	04 01	03 47	03 40	03 33	03 24	03 13	03 00	

Twilight lasts all night at latitude +60°, Apr. 23-Aug. 22; +58°, Apr. 29-Aug. 16; +56°, May 6-Aug. 9; +54°, May 13-Aug. 2; +52°, May 22-July 24; +50°, June 2-July 12.

SUNSET, 1931.

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LOCAL MEAN TIME OF SUNSET (SUN'S UPPER LIMB), AND ENDING OF EVENING TWILIGHT, MERIDIAN OF GREENWICH, 1931.

To obtain the standard time at any station, increase the local time by the number of minutes the station is west of the standard meridian, or decrease the local time by the number of minutes the station is east of the standard meridian. For southern latitudes see page 658.

Lat.		0°		+10°		+20°		+30°		+35°		+40°		+45°		+50°		+52°		+54°		+56°		+58°		+60°	
Date.																											
Aug.	9	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m
		18	09	18	20	18	33	18	48	18	56	19	06	19	17	19	31	19	38	19	45	19	53	20	02	20	13
	10	18	09	18	20	18	32	18	47	18	55	19	05	19	16	19	29	19	36	19	43	19	51	20	00	20	10
	11	18	08	18	20	18	32	18	46	18	54	19	03	19	14	19	28	19	34	19	41	19	49	19	57	20	07
	12	18	08	18	19	18	31	18	45	18	53	19	02	19	13	19	26	19	32	19	39	19	46	19	55	20	05
	13	18	08	18	19	18	30	18	44	18	52	19	01	19	11	19	24	19	30	19	37	19	44	19	52	20	02
	14	18	08	18	18	18	30	18	43	18	51	19	00	19	10	19	22	19	28	19	35	19	42	19	50	19	59
	15	18	08	18	18	18	29	18	42	18	50	18	58	19	08	19	20	19	26	19	32	19	40	19	47	19	56
	16	18	08	18	18	18	28	18	41	18	48	18	57	19	06	19	18	19	24	19	30	19	37	19	45	19	54
	17	18	07	18	17	18	28	18	40	18	47	18	56	19	05	19	17	19	22	19	28	19	35	19	42	19	51
	18	18	07	18	17	18	27	18	39	18	46	18	54	19	03	19	15	19	20	19	26	19	32	19	40	19	48
	19	18	07	18	16	18	26	18	38	18	45	18	53	19	02	19	13	19	18	19	24	19	30	19	37	19	45
	20	18	07	18	16	18	26	18	37	18	44	18	51	19	00	19	11	19	16	19	21	19	28	19	34	19	42
	21	18	06	18	15	18	25	18	36	18	42	18	50	18	58	19	09	19	14	19	19	19	25	19	32	19	39
	22	18	06	18	15	18	24	18	35	18	41	18	48	18	57	19	07	19	12	19	17	19	23	19	29	19	36
	23	18	06	18	14	18	23	18	34	18	40	18	47	18	55	19	05	19	10	19	15	19	20	19	27	19	34
	24	18	06	18	14	18	23	18	33	18	39	18	46	18	53	19	03	19	08	19	12	19	18	19	24	19	31
	25	18	06	18	13	18	22	18	32	18	38	18	44	18	52	19	01	19	05	19	10	19	15	19	21	19	28
	26	18	05	18	13	18	21	18	31	18	36	18	43	18	50	18	59	19	03	19	08	19	13	19	18	19	25
	27	18	05	18	12	18	20	18	29	18	35	18	41	18	48	18	57	19	01	19	05	19	10	19	16	19	22
	28	18	05	18	12	18	19	18	28	18	34	18	40	18	46	18	55	18	59	19	03	19	08	19	13	19	19
	29	18	04	18	11	18	18	18	27	18	32	18	38	18	45	18	53	18	56	19	00	19	05	19	10	19	16
	30	18	04	18	10	18	18	18	26	18	31	18	36	18	43	18	51	18	54	18	58	19	02	19	08	19	13
Sept.	1	18	04	18	10	18	17	18	25	18	30	18	35	18	41	18	48	18	52	18	56	19	00	19	05	19	10
	2	18	03	18	09	18	16	18	24	18	28	18	33	18	39	18	46	18	50	18	53	18	57	19	02	19	07
	3	18	03	18	09	18	15	18	22	18	27	18	32	18	37	18	44	18	48	18	51	18	55	18	59	19	04
	4	18	03	18	08	18	14	18	21	18	26	18	30	18	36	18	42	18	45	18	49	18	52	18	56	19	01
	5	18	02	18	08	18	13	18	20	18	24	18	28	18	34	18	40	18	43	18	46	18	50	18	54	18	58
	6	18	02	18	07	18	13	18	19	18	23	18	27	18	32	18	38	18	41	18	44	18	47	18	51	18	55
	7	18	02	18	06	18	12	18	18	18	21	18	25	18	30	18	36	18	38	18	41	18	44	18	48	18	52
	8	18	02	18	06	18	11	18	16	18	20	18	24	18	28	18	34	18	36	18	39	18	42	18	45	18	49
	9	18	01	18	05	18	10	18	15	18	18	18	22	18	26	18	31	18	34	18	36	18	39	18	42	18	46
	10	18	01	18	05	18	09	18	14	18	17	18	20	18	24	18	29	18	31	18	34	18	36	18	40	18	43
	11	18	00	18	04	18	08	18	13	18	16	18	18	18	22	18	27	18	29	18	31	18	34	18	37	18	40
	12	18	00	18	03	18	07	18	12	18	14	18	17	18	21	18	25	18	27	18	29	18	31	18	34	18	37
	13	18	00	18	03	18	06	18	10	18	13	18	16	18	19	18	23	18	24	18	26	18	29	18	31	18	34
	14	17	59	18	02	18	05	18	09	18	11	18	14	18	17	18	21	18	22	18	24	18	26	18	28	18	31
	15	17	59	18	02	18	04	18	08	18	10	18	12	18	15	18	18	18	20	18	22	18	23	18	26	18	28
16	17	59	18	01	18	04	18	07	18	09	18	11	18	13	18	16	18	18	18	19	18	21	18	23	18	25	

ENDING OF EVENING TWILIGHT.

	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
Aug. 9	19 20	19 34	19 51	20 15	20 30	20 50	21 16	21 53	22 15	22 45				
19	19 18	19 28	19 43	20 03	20 16	20 32	20 53	21 23	21 38	21 57	22 22	22 30	22 44	23 01
29	19 14	19 22	19 34	19 50	20 00	20 14	20 31	20 53	21 05	21 19	21 35	21 56	22 24	
Sept. 8	19 10	19 16	19 24	19 36	19 44	19 55	20 08	20 26	20 34	20 45	20 56	21 11	21 28	
18	19 06	19 09	19 14	19 22	19 28	19 36	19 46	20 00	20 07	20 13	20 22	20 32	20 44	

Twilight lasts all night at latitude +60°, Apr. 23-Aug. 22; +58°, Apr. 29-Aug. 16; +56°, May 6-Aug. 9; +54°, May 13-Aug. 2; +52°, May 22-July 24; +50°, June 2-July 12.

LOCAL MEAN TIME OF SUNRISE (SUN'S UPPER LIMB), AND BEGINNING OF MORNING TWILIGHT, MERIDIAN OF GREENWICH, 1931.

To obtain the standard time at any station, increase the local time by the number of minutes the station is west of the standard meridian, or decrease the local time by the number of minutes the station is east of the standard meridian. For southern latitudes see page 658.

Lat.	0°		+10°		+20°		+30°		+35°		+40°		+45°		+50°		+52°		+54°		+56°		+58°		+60°	
Date.																										
Sept. 15	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m
16	05	52	05	50	05	47	05	44	05	42	05	40	05	37	05	34	05	32	05	31	05	29	05	27	05	25
17	05	52	05	50	05	48	05	45	05	43	05	42	05	40	05	37	05	36	05	34	05	33	05	31	05	30
18	05	51	05	50	05	48	05	46	05	44	05	43	05	41	05	38	05	38	05	36	05	35	05	34	05	32
19	05	51	05	50	05	48	05	46	05	45	05	44	05	42	05	40	05	39	05	38	05	37	05	36	05	34
20	05	50	05	49	05	48	05	46	05	46	05	44	05	43	05	41	05	41	05	40	05	39	05	38	05	37
21	05	50	05	49	05	48	05	47	05	46	05	45	05	44	05	43	05	42	05	42	05	41	05	40	05	39
22	05	50	05	49	05	49	05	48	05	47	05	46	05	46	05	44	05	44	05	43	05	43	05	42	05	41
23	05	50	05	49	05	49	05	48	05	48	05	47	05	47	05	46	05	46	05	45	05	45	05	44	05	44
24	05	49	05	49	05	49	05	49	05	48	05	48	05	48	05	47	05	47	05	47	05	47	05	46	05	46
25	05	49	05	49	05	49	05	49	05	49	05	49	05	49	05	49	05	49	05	49	05	49	05	48	05	48
26	05	48	05	49	05	49	05	50	05	50	05	50	05	50	05	50	05	50	05	51	05	51	05	51	05	51
27	05	48	05	49	05	50	05	50	05	51	05	51	05	52	05	52	05	52	05	52	05	53	05	53	05	53
28	05	48	05	49	05	50	05	51	05	52	05	52	05	53	05	54	05	54	05	54	05	55	05	55	05	56
29	05	47	05	49	05	50	05	52	05	52	05	53	05	54	05	55	05	56	05	56	05	57	05	57	05	58
Oct. 30	05	47	05	49	05	50	05	52	05	53	05	54	05	55	05	57	05	57	05	58	05	59	05	59	06	00
1	05	47	05	49	05	51	05	53	05	54	05	55	05	56	05	58	05	59	06	00	06	01	06	02	06	03
2	05	46	05	49	05	51	05	53	05	55	05	56	05	58	06	00	06	00	06	02	06	03	06	04	06	05
3	05	46	05	49	05	51	05	54	05	55	05	57	05	59	06	01	06	02	06	03	06	05	06	06	06	08
4	05	46	05	49	05	51	05	54	05	56	05	58	06	00	06	03	06	04	06	05	06	07	06	08	06	10
5	05	46	05	48	05	52	05	55	05	57	05	59	06	01	06	04	06	06	06	07	06	09	06	10	06	12
6	05	45	05	48	05	52	05	56	05	58	06	00	06	03	06	06	06	07	06	09	06	11	06	12	06	15
7	05	45	05	48	05	52	05	56	05	58	06	01	06	04	06	07	06	09	06	11	06	13	06	15	06	17
8	05	45	05	48	05	52	05	57	05	59	06	02	06	05	06	09	06	11	06	13	06	15	06	17	06	19
9	05	44	05	48	05	53	05	57	06	00	06	03	06	06	06	11	06	12	06	14	06	17	06	19	06	22
10	05	44	05	48	05	53	05	58	06	01	06	04	06	08	06	12	06	14	06	16	06	19	06	21	06	24
11	05	44	05	48	05	53	05	58	06	02	06	05	06	09	06	14	06	16	06	18	06	21	06	24	06	27
12	05	44	05	48	05	54	05	59	06	02	06	06	06	10	06	15	06	18	06	20	06	23	06	26	06	29
13	05	43	05	48	05	54	06	00	06	03	06	07	06	12	06	17	06	19	06	22	06	25	06	28	06	32
14	05	43	05	48	05	54	06	00	06	04	06	08	06	13	06	18	06	21	06	24	06	27	06	30	06	34
15	05	43	05	48	05	54	06	01	06	05	06	09	06	14	06	20	06	23	06	26	06	29	06	32	06	36
16	05	43	05	49	05	55	06	02	06	06	06	10	06	16	06	22	06	24	06	28	06	31	06	35	06	39
17	05	42	05	49	05	55	06	02	06	07	06	11	06	17	06	23	06	26	06	29	06	33	06	37	06	41
18	05	42	05	49	05	56	06	03	06	08	06	12	06	18	06	25	06	28	06	31	06	35	06	39	06	44
19	05	42	05	49	05	56	06	04	06	08	06	13	06	19	06	26	06	30	06	33	06	37	06	42	06	46
20	05	42	05	49	05	56	06	04	06	09	06	14	06	21	06	28	06	31	06	35	06	39	06	44	06	49
21	05	42	05	49	05	57	06	05	06	10	06	16	06	22	06	30	06	33	06	37	06	41	06	46	06	51

BEGINNING OF MORNING TWILIGHT.

Sept. 8	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m
18	04	46	04	40	04	31	04	19	04	10	03	59	03	46	03	28	03	19	03	08	02	56	02	41	02	23
28	04	39	04	39	04	36	04	25	04	19	04	11	04	01	03	47	03	40	03	33	03	24	03	13	03	00
Oct. 8	04	36	04	38	04	39	04	37	04	35	04	32	04	28	04	05	04	01	03	55	03	48	03	41	03	32
18	04	32	04	38	04	42	04	43	04	43	04	42	04	40	04	37	04	36	04	34	04	31	04	28	04	25
28	04	30	04	39	04	45	04	50	04	51	04	52	04	53	04	53	04	52	04	52	04	51	04	50	04	48

SUNSET, 1931.

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LOCAL MEAN TIME OF SUNSET (SUN'S UPPER LIMB), AND ENDING OF EVENING TWILIGHT, MERIDIAN OF GREENWICH, 1931.

To obtain the standard time at any station, increase the local time by the number of minutes the station is west of the standard meridian, or decrease the local time by the number of minutes the station is east of the standard meridian. For southern latitudes see page 658.

Lat. Date.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
Sept. 15	h m 17 59	h m 18 01	h m 18 04	h m 18 07	h m 18 09	h m 18 11	h m 18 13	h m 18 16	h m 18 18	h m 18 19	h m 18 21	h m 18 23	h m 18 25
16	h m 17 58	h m 18 00	h m 18 03	h m 18 05	h m 18 07	h m 18 09	h m 18 11	h m 18 14	h m 18 15	h m 18 16	h m 18 18	h m 18 20	h m 18 22
17	h m 17 58	h m 18 00	h m 18 02	h m 18 04	h m 18 06	h m 18 07	h m 18 09	h m 18 12	h m 18 13	h m 18 14	h m 18 15	h m 18 17	h m 18 18
18	h m 17 58	h m 17 59	h m 18 01	h m 18 03	h m 18 04	h m 18 06	h m 18 07	h m 18 10	h m 18 11	h m 18 13	h m 18 14	h m 18 15	h m 18 15
19	h m 17 57	h m 17 58	h m 18 00	h m 18 02	h m 18 03	h m 18 04	h m 18 05	h m 18 07	h m 18 08	h m 18 09	h m 18 10	h m 18 11	h m 18 12
20	h m 17 57	h m 17 58	h m 17 59	h m 18 00	h m 18 01	h m 18 02	h m 18 04	h m 18 05	h m 18 06	h m 18 06	h m 18 07	h m 18 08	h m 18 09
21	h m 17 56	h m 17 57	h m 17 58	h m 17 59	h m 18 00	h m 18 01	h m 18 02	h m 18 03	h m 18 03	h m 18 04	h m 18 04	h m 18 06	h m 18 06
22	h m 17 56	h m 17 57	h m 17 57	h m 17 58	h m 17 58	h m 17 59	h m 18 00	h m 18 01	h m 18 01	h m 18 02	h m 18 02	h m 18 03	h m 18 03
23	h m 17 56	h m 17 56	h m 17 56	h m 17 57	h m 17 57	h m 17 57	h m 17 58	h m 17 58	h m 17 59	h m 17 59	h m 17 59	h m 18 00	h m 18 00
24	h m 17 56	h m 17 55	h m 17 55	h m 17 56	h m 17 56	h m 17 56	h m 17 56	h m 17 56	h m 17 56	h m 17 56	h m 17 57	h m 17 57	h m 17 57
25	h m 17 55	h m 17 55	h m 17 54	h m 17 54	h m 17 54	h m 17 54	h m 17 54	h m 17 54	h m 17 54	h m 17 54	h m 17 54	h m 17 54	h m 17 54
26	h m 17 55	h m 17 54	h m 17 54	h m 17 53	h m 17 53	h m 17 52	h m 17 52	h m 17 52	h m 17 52	h m 17 52	h m 17 51	h m 17 51	h m 17 51
27	h m 17 54	h m 17 54	h m 17 53	h m 17 52	h m 17 51	h m 17 51	h m 17 50	h m 17 50	h m 17 49	h m 17 49	h m 17 49	h m 17 48	h m 17 48
28	h m 17 54	h m 17 53	h m 17 52	h m 17 50	h m 17 50	h m 17 49	h m 17 48	h m 17 47	h m 17 47	h m 17 46	h m 17 46	h m 17 46	h m 17 45
29	h m 17 54	h m 17 52	h m 17 51	h m 17 49	h m 17 48	h m 17 48	h m 17 46	h m 17 45	h m 17 45	h m 17 44	h m 17 43	h m 17 43	h m 17 42
Oct. 30	h m 17 54	h m 17 52	h m 17 50	h m 17 48	h m 17 47	h m 17 46	h m 17 44	h m 17 43	h m 17 42	h m 17 42	h m 17 41	h m 17 40	h m 17 39
1	h m 17 53	h m 17 51	h m 17 49	h m 17 47	h m 17 46	h m 17 44	h m 17 43	h m 17 41	h m 17 40	h m 17 39	h m 17 38	h m 17 37	h m 17 36
2	h m 17 53	h m 17 50	h m 17 48	h m 17 46	h m 17 44	h m 17 43	h m 17 41	h m 17 39	h m 17 38	h m 17 37	h m 17 36	h m 17 34	h m 17 33
3	h m 17 52	h m 17 50	h m 17 47	h m 17 44	h m 17 43	h m 17 41	h m 17 39	h m 17 36	h m 17 35	h m 17 34	h m 17 33	h m 17 32	h m 17 30
4	h m 17 52	h m 17 49	h m 17 46	h m 17 43	h m 17 42	h m 17 39	h m 17 37	h m 17 34	h m 17 33	h m 17 32	h m 17 30	h m 17 29	h m 17 27
5	h m 17 52	h m 17 49	h m 17 46	h m 17 42	h m 17 40	h m 17 38	h m 17 35	h m 17 32	h m 17 31	h m 17 29	h m 17 28	h m 17 26	h m 17 24
6	h m 17 52	h m 17 48	h m 17 45	h m 17 41	h m 17 39	h m 17 36	h m 17 33	h m 17 30	h m 17 28	h m 17 27	h m 17 25	h m 17 23	h m 17 21
7	h m 17 51	h m 17 48	h m 17 44	h m 17 40	h m 17 37	h m 17 35	h m 17 32	h m 17 28	h m 17 26	h m 17 24	h m 17 22	h m 17 20	h m 17 18
8	h m 17 51	h m 17 47	h m 17 43	h m 17 38	h m 17 36	h m 17 33	h m 17 30	h m 17 26	h m 17 24	h m 17 22	h m 17 20	h m 17 18	h m 17 15
9	h m 17 51	h m 17 46	h m 17 42	h m 17 37	h m 17 34	h m 17 31	h m 17 28	h m 17 24	h m 17 22	h m 17 20	h m 17 17	h m 17 15	h m 17 12
10	h m 17 50	h m 17 46	h m 17 41	h m 17 36	h m 17 33	h m 17 30	h m 17 26	h m 17 22	h m 17 20	h m 17 17	h m 17 15	h m 17 12	h m 17 09
11	h m 17 50	h m 17 45	h m 17 40	h m 17 35	h m 17 32	h m 17 28	h m 17 24	h m 17 19	h m 17 17	h m 17 15	h m 17 12	h m 17 09	h m 17 06
12	h m 17 50	h m 17 45	h m 17 40	h m 17 34	h m 17 30	h m 17 27	h m 17 22	h m 17 17	h m 17 15	h m 17 12	h m 17 10	h m 17 06	h m 17 03
13	h m 17 50	h m 17 44	h m 17 39	h m 17 33	h m 17 29	h m 17 25	h m 17 21	h m 17 15	h m 17 13	h m 17 10	h m 17 07	h m 17 04	h m 17 00
14	h m 17 50	h m 17 44	h m 17 38	h m 17 32	h m 17 28	h m 17 24	h m 17 19	h m 17 13	h m 17 11	h m 17 08	h m 17 05	h m 17 01	h m 16 57
15	h m 17 49	h m 17 43	h m 17 37	h m 17 30	h m 17 27	h m 17 22	h m 17 17	h m 17 11	h m 17 08	h m 17 05	h m 17 02	h m 16 58	h m 16 54
16	h m 17 49	h m 17 43	h m 17 37	h m 17 29	h m 17 25	h m 17 21	h m 17 15	h m 17 09	h m 17 06	h m 17 03	h m 17 00	h m 16 56	h m 16 51
17	h m 17 49	h m 17 42	h m 17 36	h m 17 28	h m 17 24	h m 17 19	h m 17 14	h m 17 07	h m 17 04	h m 17 01	h m 16 57	h m 16 53	h m 16 48
18	h m 17 49	h m 17 42	h m 17 35	h m 17 27	h m 17 23	h m 17 18	h m 17 12	h m 17 05	h m 17 02	h m 16 58	h m 16 55	h m 16 50	h m 16 46
19	h m 17 48	h m 17 42	h m 17 34	h m 17 26	h m 17 22	h m 17 16	h m 17 10	h m 17 03	h m 17 00	h m 16 56	h m 16 52	h m 16 48	h m 16 43
20	h m 17 48	h m 17 41	h m 17 34	h m 17 25	h m 17 20	h m 17 15	h m 17 08	h m 17 01	h m 16 58	h m 16 54	h m 16 50	h m 16 45	h m 16 40
21	h m 17 48	h m 17 41	h m 17 33	h m 17 24	h m 17 19	h m 17 13	h m 17 07	h m 16 59	h m 16 56	h m 16 52	h m 16 47	h m 16 42	h m 16 37

ENDING OF EVENING TWILIGHT.

Sept. 8	h m 19 10	h m 19 16	h m 19 24	h m 19 36	h m 19 44	h m 19 55	h m 20 08	h m 20 26	h m 20 34	h m 20 45	h m 20 56	h m 21 11	h m 21 28
18	h m 19 06	h m 19 09	h m 19 14	h m 19 22	h m 19 28	h m 19 36	h m 19 46	h m 20 00	h m 20 07	h m 20 13	h m 20 22	h m 20 32	h m 20 44
28	h m 19 03	h m 19 02	h m 19 05	h m 19 09	h m 19 13	h m 19 18	h m 19 25	h m 19 35	h m 19 39	h m 19 45	h m 19 51	h m 19 58	h m 20 06
Oct. 8	h m 19 00	h m 18 57	h m 18 56	h m 18 57	h m 18 59	h m 19 02	h m 19 06	h m 19 12	h m 19 15	h m 19 19	h m 19 23	h m 19 27	h m 19 33
18	h m 18 58	h m 18 52	h m 18 48	h m 18 47	h m 18 46	h m 18 47	h m 18 49	h m 18 51	h m 18 53	h m 18 55	h m 18 57	h m 19 00	h m 19 03
28	h m 18 58	h m 18 49	h m 18 42	h m 18 37	h m 18 36	h m 18 34	h m 18 34	h m 18 34	h m 18 34	h m 18 35	h m 18 35	h m 18 36	h m 18 37

LOCAL MEAN TIME OF SUNRISE (SUN'S UPPER LIMB), AND BEGINNING OF MORNING TWILIGHT, MERIDIAN OF GREENWICH, 1931.

To obtain the standard time at any station, increase the local time by the number of minutes the station is west of the standard meridian, or decrease the local time by the number of minutes the station is east of the standard meridian. For southern latitudes see page 658.

Lat.		Date.															
		0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°			
		h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
Oct.	21	05 42	05 49	05 57	06 05	06 10	06 16	06 22	06 30	06 33	06 37	06 41	06 46	06 51			
	22	05 41	05 49	05 57	06 06	06 11	06 17	06 23	06 31	06 35	06 39	06 43	06 48	06 54			
	23	05 41	05 49	05 57	06 06	06 12	06 18	06 25	06 33	06 37	06 41	06 45	06 51	06 56			
	24	05 41	05 49	05 58	06 07	06 13	06 19	06 26	06 35	06 38	06 43	06 48	06 53	06 59			
	25	05 41	05 50	05 58	06 08	06 14	06 20	06 28	06 36	06 40	06 45	06 50	06 55	07 02			
	26	05 41	05 50	05 59	06 09	06 14	06 21	06 29	06 38	06 42	06 47	06 52	06 58	07 04			
	27	05 41	05 50	05 59	06 10	06 15	06 22	06 30	06 40	06 44	06 49	06 54	07 00	07 06			
	28	05 41	05 50	05 59	06 10	06 16	06 23	06 32	06 41	06 46	06 51	06 56	07 02	07 09			
	29	05 40	05 50	06 00	06 11	06 17	06 24	06 33	06 43	06 47	06 53	06 58	07 04	07 12			
	30	05 40	05 50	06 00	06 12	06 18	06 26	06 34	06 44	06 49	06 55	07 00	07 07	07 14			
Nov.	31	05 40	05 50	06 01	06 12	06 19	06 27	06 36	06 46	06 51	06 56	07 02	07 09	07 17			
	1	05 40	05 50	06 01	06 13	06 20	06 28	06 37	06 48	06 53	06 58	07 05	07 12	07 19			
	2	05 40	05 51	06 02	06 14	06 21	06 29	06 38	06 50	06 55	07 00	07 07	07 14	07 22			
	3	05 40	05 51	06 02	06 15	06 22	06 30	06 40	06 51	06 56	07 02	07 09	07 16	07 24			
	4	05 40	05 51	06 02	06 16	06 23	06 31	06 41	06 53	06 58	07 04	07 11	07 18	07 27			
	5	05 40	05 51	06 03	06 16	06 24	06 32	06 42	06 54	07 00	07 06	07 13	07 21	07 30			
	6	05 40	05 52	06 04	06 17	06 25	06 34	06 44	06 56	07 02	07 08	07 15	07 23	07 32			
	7	05 40	05 52	06 04	06 18	06 26	06 35	06 45	06 58	07 04	07 10	07 17	07 26	07 35			
	8	05 40	05 52	06 04	06 19	06 27	06 36	06 47	07 00	07 06	07 12	07 20	07 28	07 37			
	9	05 40	05 52	06 05	06 19	06 28	06 37	06 48	07 01	07 07	07 14	07 22	07 30	07 40			
	10	05 40	05 53	06 06	06 20	06 29	06 38	06 49	07 03	07 09	07 16	07 24	07 32	07 42			
	11	05 41	05 53	06 06	06 21	06 30	06 39	06 51	07 04	07 11	07 18	07 26	07 35	07 45			
	12	05 41	05 53	06 06	06 22	06 31	06 40	06 52	07 06	07 13	07 20	07 28	07 37	07 48			
	13	05 41	05 54	06 07	06 23	06 32	06 42	06 53	07 08	07 14	07 22	07 30	07 39	07 50			
	14	05 41	05 54	06 08	06 24	06 33	06 43	06 55	07 09	07 16	07 24	07 32	07 42	07 53			
	15	05 41	05 54	06 08	06 24	06 34	06 44	06 56	07 11	07 18	07 26	07 34	07 44	07 55			
	16	05 41	05 55	06 09	06 25	06 34	06 45	06 58	07 13	07 20	07 28	07 36	07 46	07 58			
	17	05 41	05 55	06 10	06 26	06 35	06 46	06 59	07 14	07 22	07 29	07 38	07 48	08 00			
	18	05 42	05 56	06 10	06 27	06 36	06 47	07 00	07 16	07 23	07 31	07 40	07 51	08 03			
	19	05 42	05 56	06 11	06 28	06 37	06 48	07 02	07 18	07 25	07 33	07 42	07 53	08 05			
	20	05 42	05 56	06 11	06 28	06 38	06 50	07 03	07 19	07 27	07 35	07 44	07 55	08 08			
	21	05 42	05 57	06 12	06 29	06 39	06 51	07 04	07 21	07 28	07 37	07 46	07 57	08 10			
	22	05 42	05 57	06 13	06 30	06 40	06 52	07 06	07 22	07 30	07 39	07 48	08 00	08 12			
	23	05 43	05 58	06 13	06 31	06 41	06 53	07 07	07 24	07 32	07 40	07 50	08 02	08 15			
	24	05 43	05 58	06 14	06 32	06 42	06 54	07 08	07 25	07 33	07 42	07 52	08 04	08 17			
	25	05 43	05 58	06 14	06 33	06 43	06 55	07 09	07 27	07 35	07 44	07 54	08 06	08 20			
	26	05 44	05 59	06 15	06 34	06 44	06 56	07 11	07 28	07 37	07 46	07 56	08 08	08 22			

BEGINNING OF MORNING TWILIGHT.

		h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
Oct.	18	04 32	04 38	04 42	04 43	04 43	04 42	04 40	04 37	04 36	04 34	04 31	04 28	04 25			
	28	04 30	04 39	04 45	04 50	04 51	04 52	04 53	04 53	04 52	04 52	04 51	04 50	04 48			
Nov.	7	04 29	04 40	04 49	04 56	05 00	05 02	05 05	05 07	05 08	05 09	05 09	05 10	05 10			
	17	04 29	04 42	04 53	05 03	05 08	05 12	05 17	05 21	05 23	05 25	05 26	05 28	05 30			
	27	04 30	04 45	04 58	05 10	05 16	05 22	05 28	05 34	05 37	05 39	05 42	05 45	05 48			

SUNSET, 1931.

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LOCAL MEAN TIME OF SUNSET (SUN'S UPPER LIMB), AND ENDING OF EVENING TWILIGHT, MERIDIAN OF GREENWICH, 1931.

To obtain the standard time at any station, increase the local time by the number of minutes the station is west of the standard meridian, or decrease the local time by the number of minutes the station is east of the standard meridian. For southern latitudes see page 638.

Lat.	Date.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
		h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
Oct.	21	17 48	17 41	17 33	17 24	17 19	17 13	17 07	16 59	16 56	16 52	16 47	16 42	16 37
	22	17 48	17 40	17 32	17 23	17 18	17 12	17 05	16 57	16 53	16 49	16 45	16 40	16 34
	23	17 48	17 40	17 32	17 22	17 17	17 11	17 04	16 55	16 51	16 47	16 42	16 37	16 31
	24	17 48	17 39	17 31	17 21	17 16	17 09	17 02	16 53	16 49	16 45	16 40	16 35	16 28
	25	17 48	17 39	17 30	17 20	17 14	17 08	17 00	16 51	16 47	16 43	16 38	16 32	16 26
	26	17 47	17 39	17 30	17 19	17 13	17 07	16 59	16 50	16 45	16 40	16 35	16 30	16 23
	27	17 47	17 38	17 29	17 18	17 12	17 05	16 57	16 48	16 43	16 38	16 33	16 27	16 20
	28	17 47	17 38	17 28	17 17	17 11	17 04	16 56	16 46	16 41	16 36	16 31	16 24	16 18
	29	17 47	17 38	17 28	17 16	17 10	17 03	16 54	16 44	16 39	16 34	16 28	16 22	16 15
	30	17 47	17 37	17 27	17 16	17 09	17 02	16 53	16 42	16 38	16 32	16 26	16 20	16 12
	31	17 47	17 37	17 27	17 15	17 08	17 00	16 51	16 40	16 36	16 30	16 24	16 17	16 10
Nov.	1	17 47	17 37	17 26	17 14	17 07	16 59	16 50	16 39	16 34	16 28	16 22	16 15	16 07
	2	17 47	17 37	17 26	17 13	17 06	16 58	16 48	16 37	16 32	16 26	16 20	16 12	16 04
	3	17 47	17 36	17 25	17 12	17 05	16 57	16 47	16 35	16 30	16 24	16 18	16 10	16 02
	4	17 47	17 36	17 25	17 12	17 04	16 56	16 46	16 34	16 28	16 22	16 15	16 08	15 59
	5	17 47	17 36	17 24	17 11	17 03	16 54	16 44	16 32	16 26	16 20	16 13	16 05	15 56
	6	17 47	17 36	17 24	17 10	17 02	16 53	16 43	16 30	16 25	16 18	16 11	16 03	15 54
	7	17 47	17 36	17 23	17 09	17 01	16 52	16 42	16 29	16 23	16 16	16 09	16 01	15 52
	8	17 47	17 35	17 23	17 09	17 00	16 51	16 40	16 27	16 21	16 15	16 07	15 59	15 49
	9	17 47	17 35	17 22	17 08	17 00	16 50	16 39	16 26	16 20	16 13	16 05	15 56	15 47
	10	17 48	17 35	17 22	17 07	16 59	16 49	16 38	16 24	16 18	16 11	16 03	15 54	15 44
	11	17 48	17 35	17 21	17 07	16 58	16 48	16 37	16 23	16 16	16 09	16 01	15 52	15 42
	12	17 48	17 35	17 21	17 06	16 57	16 47	16 36	16 21	16 15	16 08	15 59	15 50	15 40
	13	17 48	17 35	17 21	17 06	16 57	16 46	16 34	16 20	16 13	16 06	15 58	15 48	15 37
	14	17 48	17 35	17 21	17 05	16 56	16 46	16 33	16 19	16 12	16 04	15 56	15 46	15 35
	15	17 48	17 35	17 20	17 04	16 55	16 45	16 32	16 17	16 10	16 03	15 54	15 44	15 33
	16	17 48	17 35	17 20	17 04	16 55	16 44	16 31	16 16	16 09	16 01	15 52	15 42	15 31
	17	17 48	17 35	17 20	17 04	16 54	16 43	16 30	16 15	16 08	16 00	15 51	15 40	15 28
	18	17 49	17 35	17 20	17 03	16 53	16 42	16 29	16 14	16 06	15 58	15 49	15 38	15 26
	19	17 49	17 35	17 20	17 03	16 53	16 42	16 28	16 12	16 05	15 57	15 47	15 37	15 24
	20	17 49	17 35	17 20	17 02	16 52	16 41	16 28	16 11	16 04	15 55	15 46	15 35	15 22
	21	17 49	17 35	17 20	17 02	16 52	16 40	16 27	16 10	16 02	15 54	15 44	15 33	15 20
	22	17 50	17 35	17 19	17 02	16 51	16 40	16 26	16 09	16 01	15 53	15 43	15 32	15 19
	23	17 50	17 35	17 19	17 01	16 51	16 39	16 25	16 08	16 00	15 51	15 41	15 30	15 17
	24	17 50	17 35	17 19	17 01	16 50	16 39	16 24	16 07	15 59	15 50	15 40	15 28	15 15
	25	17 51	17 35	17 19	17 01	16 50	16 38	16 24	16 06	15 58	15 49	15 39	15 27	15 13
	26	17 51	17 35	17 19	17 01	16 50	16 38	16 23	16 06	15 57	15 48	15 38	15 26	15 12

ENDING OF EVENING TWILIGHT.

Oct.	18	18 58	18 52	18 48	18 47	18 46	18 47	18 49	18 51	18 53	18 55	18 57	19 00	19 03
	28	18 58	18 49	18 42	18 37	18 36	18 34	18 34	18 34	18 34	18 35	18 35	18 36	18 37
Nov.	7	18 59	18 48	18 38	18 31	18 27	18 24	18 21	18 19	18 18	18 17	18 17	18 16	18 15
	17	19 01	18 48	18 36	18 26	18 21	18 17	18 12	18 07	18 06	18 04	18 02	18 00	17 58
	27	19 05	18 50	18 37	18 24	18 18	18 13	18 06	18 00	17 57	17 55	17 52	17 49	17 46

LOCAL MEAN TIME OF SUNRISE (SUN'S UPPER LIMB), AND BEGINNING OF
MORNING TWILIGHT, MERIDIAN OF GREENWICH, 1931.

To obtain the standard time at any station, increase the local time by the number of minutes the station is west of the standard meridian, or decrease the local time by the number of minutes the station is east of the standard meridian. For southern latitudes see page 658.

Lat. Date.	0°		+10°		+20°		+30°		+35°		+40°		+45°		+50°		+52°		+54°		+56°		+58°		+60°	
	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m
Nov. 26	05	44	05	59	06	15	06	34	06	44	06	56	07	11	07	28	07	37	07	46	07	56	08	08	08	22
27	05	44	05	59	06	16	06	34	06	45	06	57	07	12	07	30	07	38	07	47	07	58	08	10	08	24
28	05	44	06	00	06	16	06	35	06	46	06	58	07	13	07	31	07	40	07	49	08	00	08	12	08	26
29	05	44	06	00	06	17	06	36	06	47	07	00	07	14	07	33	07	41	07	51	08	02	08	14	08	29
30	05	45	06	01	06	18	06	37	06	48	07	01	07	16	07	34	07	43	07	52	08	03	08	16	08	31
Dec. 1	05	45	06	01	06	18	06	38	06	49	07	02	07	17	07	35	07	44	07	54	08	05	08	18	08	33
2	05	46	06	02	06	19	06	38	06	50	07	03	07	18	07	37	07	46	07	56	08	07	08	20	08	35
3	05	46	06	02	06	20	06	39	06	51	07	04	07	19	07	38	07	47	07	57	08	08	08	22	08	37
4	05	46	06	03	06	20	06	40	06	51	07	05	07	20	07	39	07	48	07	58	08	10	08	23	08	39
5	05	47	06	03	06	21	06	41	06	52	07	06	07	21	07	41	07	50	08	00	08	12	08	25	08	41
6	05	47	06	04	06	21	06	42	06	53	07	07	07	22	07	42	07	51	08	01	08	13	08	27	08	43
7	05	48	06	04	06	22	06	42	06	54	07	08	07	24	07	43	07	52	08	03	08	14	08	28	08	44
8	05	48	06	05	06	23	06	43	06	55	07	08	07	25	07	44	07	54	08	04	08	16	08	30	08	46
9	05	48	06	05	06	23	06	44	06	56	07	09	07	26	07	45	07	55	08	05	08	17	08	31	08	48
10	05	49	06	06	06	24	06	44	06	56	07	10	07	27	07	46	07	56	08	07	08	19	08	33	08	49
11	05	49	06	06	06	24	06	45	06	57	07	11	07	27	07	47	07	57	08	08	08	20	08	34	08	51
12	05	50	06	07	06	25	06	46	06	58	07	12	07	28	07	48	07	58	08	09	08	21	08	35	08	52
13	05	50	06	07	06	26	06	46	06	59	07	13	07	29	07	49	07	59	08	10	08	22	08	37	08	54
14	05	51	06	08	06	26	06	47	06	59	07	13	07	30	07	50	08	00	08	11	08	23	08	38	08	55
15	05	51	06	08	06	27	06	48	07	00	07	14	07	31	07	51	08	01	08	12	08	24	08	39	08	56
16	05	52	06	09	06	27	06	48	07	01	07	15	07	32	07	52	08	02	08	13	08	25	08	40	08	57
17	05	52	06	10	06	28	06	49	07	01	07	16	07	32	07	53	08	03	08	14	08	26	08	41	08	58
18	05	53	06	10	06	28	06	50	07	02	07	16	07	33	07	54	08	04	08	14	08	27	08	42	08	59
19	05	53	06	10	06	29	06	50	07	03	07	17	07	34	07	54	08	04	08	15	08	28	08	43	09	00
20	05	54	06	11	06	30	06	51	07	03	07	17	07	34	07	55	08	05	08	16	08	29	08	43	09	01
21	05	54	06	12	06	30	06	51	07	04	07	18	07	35	07	56	08	06	08	17	08	29	08	44	09	02
22	05	55	06	12	06	31	06	52	07	04	07	18	07	35	07	56	08	06	08	17	08	30	08	45	09	02
23	05	55	06	12	06	31	06	52	07	05	07	19	07	36	07	57	08	07	08	18	08	30	08	45	09	03
24	05	56	06	13	06	32	06	53	07	05	07	19	07	36	07	57	08	07	08	18	08	31	08	46	09	03
25	05	56	06	13	06	32	06	53	07	06	07	20	07	37	07	57	08	07	08	18	08	31	08	46	09	04
26	05	57	06	14	06	32	06	54	07	06	07	20	07	37	07	58	08	08	08	19	08	32	08	46	09	04
27	05	57	06	14	06	33	06	54	07	06	07	21	07	37	07	58	08	08	08	19	08	32	08	46	09	04
28	05	58	06	15	06	33	06	55	07	07	07	21	07	38	07	58	08	08	08	19	08	32	08	47	09	04
29	05	58	06	15	06	34	06	55	07	07	07	21	07	38	07	59	08	08	08	20	08	32	08	47	09	04
30	05	58	06	16	06	34	06	55	07	08	07	22	07	38	07	59	08	08	08	20	08	32	08	47	09	04
31	05	59	06	16	06	35	06	56	07	08	07	22	07	38	07	59	08	08	08	20	08	32	08	46	09	04
32	06	00	06	17	06	35	06	56	07	08	07	22	07	39	07	59	08	08	08	20	08	32	08	46	09	03

BEGINNING OF MORNING TWILIGHT.

Lat. Date.	0°		+10°		+20°		+30°		+35°		+40°		+45°		+50°		+52°		+54°		+56°		+58°		+60°	
	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m
Nov. 17	04	29	04	42	04	53	05	03	05	08	05	12	05	17	05	21	05	23	05	25	05	26	05	28	05	30
27	04	30	04	45	04	58	05	10	05	16	05	22	05	28	05	34	05	37	05	39	05	42	05	45	05	48
Dec. 7	04	33	04	49	05	04	05	17	05	24	05	31	05	38	05	45	05	48	05	51	05	55	05	58	06	02
17	04	37	04	54	05	09	05	24	05	31	05	38	05	45	05	53	05	57	06	01	06	05	06	09	06	13
27	04	42	04	59	05	14	05	29	05	36	05	43	05	51	05	59	06	02	06	06	10	06	14	06	18	
32	04	45	05	01	05	16	05	31	05	38	05	45	05	52	06	00	06	03	06	07	10	06	14	06	18	

SUNSET, 1931.

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LOCAL MEAN TIME OF SUNSET (SUN'S UPPER LIMB), AND ENDING OF EVENING TWILIGHT, MERIDIAN OF GREENWICH, 1931.

To obtain the standard time at any station, increase the local time by the number of minutes the station is west of the standard meridian, or decrease the local time by the number of minutes the station is east of the standard meridian. For southern latitudes see page 658.

Lat. Date.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
Nov. 26	h m 17 51	h m 17 35	h m 17 19	h m 17 01	h m 16 50	h m 16 38	h m 16 23	h m 16 06	h m 15 57	h m 15 48	h m 15 38	h m 15 26	h m 15 12
27	17 51	17 36	17 19	17 00	16 50	16 37	16 22	16 05	15 56	15 47	15 36	15 24	15 10
28	17 51	17 36	17 19	17 00	16 49	16 37	16 22	16 04	15 55	15 46	15 35	15 23	15 08
29	17 52	17 36	17 19	17 00	16 49	16 36	16 21	16 03	15 54	15 45	15 34	15 22	15 07
30	17 52	17 36	17 19	17 00	16 49	16 36	16 21	16 02	15 54	15 44	15 33	15 20	15 05
Dec. 1	17 52	17 36	17 19	17 00	16 49	16 36	16 20	16 02	15 53	15 43	15 32	15 19	15 04
2	17 53	17 37	17 20	17 00	16 48	16 36	16 20	16 01	15 52	15 42	15 31	15 18	15 03
3	17 53	17 37	17 20	17 00	16 48	16 35	16 20	16 01	15 52	15 42	15 30	15 17	15 02
4	17 54	17 37	17 20	17 00	16 48	16 35	16 19	16 00	15 51	15 41	15 30	15 16	15 00
5	17 54	17 38	17 20	17 00	16 48	16 35	16 19	16 00	15 51	15 40	15 29	15 15	14 59
6	17 54	17 38	17 20	17 00	16 48	16 35	16 19	15 59	15 50	15 40	15 28	15 14	14 58
7	17 55	17 38	17 20	17 00	16 48	16 35	16 19	15 59	15 50	15 39	15 27	15 14	14 57
8	17 55	17 38	17 21	17 00	16 48	16 35	16 18	15 59	15 49	15 39	15 27	15 13	14 57
9	17 56	17 39	17 21	17 00	16 48	16 35	16 18	15 58	15 49	15 38	15 26	15 12	14 56
10	17 56	17 39	17 21	17 00	16 48	16 35	16 18	15 58	15 49	15 38	15 26	15 12	14 55
11	17 57	17 40	17 22	17 01	16 49	16 35	16 18	15 58	15 49	15 38	15 26	15 11	14 55
12	17 57	17 40	17 22	17 01	16 49	16 35	16 18	15 58	15 48	15 38	15 25	15 11	14 54
13	17 58	17 40	17 22	17 01	16 49	16 35	16 18	15 58	15 48	15 38	15 25	15 11	14 54
14	17 58	17 41	17 22	17 02	16 49	16 35	16 19	15 58	15 48	15 38	15 25	15 11	14 54
15	17 58	17 41	17 23	17 02	16 50	16 36	16 19	15 58	15 48	15 38	15 25	15 10	14 53
16	17 59	17 42	17 23	17 02	16 50	16 36	16 19	15 58	15 49	15 38	15 25	15 10	14 53
17	18 00	17 42	17 24	17 02	16 50	16 36	16 19	15 59	15 49	15 38	15 25	15 10	14 53
18	18 00	17 42	17 24	17 03	16 50	16 36	16 20	15 59	15 49	15 38	15 25	15 10	14 53
19	18 00	17 43	17 25	17 03	16 51	16 37	16 20	15 59	15 49	15 38	15 25	15 11	14 53
20	18 01	17 44	17 25	17 04	16 51	16 37	16 20	16 00	15 50	15 38	15 26	15 11	14 53
21	18 02	17 44	17 26	17 04	16 52	16 38	16 21	16 00	15 50	15 39	15 26	15 11	14 54
22	18 02	17 44	17 26	17 05	16 52	16 38	16 21	16 00	15 50	15 39	15 27	15 12	14 54
23	18 02	17 45	17 26	17 05	16 53	16 39	16 22	16 01	15 51	15 40	15 27	15 12	14 55
24	18 03	17 46	17 27	17 06	16 53	16 39	16 22	16 02	15 52	15 40	15 28	15 13	14 55
25	18 03	17 46	17 28	17 06	16 54	16 40	16 23	16 02	15 52	15 41	15 28	15 14	14 56
26	18 04	17 47	17 28	17 07	16 54	16 40	16 24	16 03	15 53	15 42	15 29	15 14	14 57
27	18 04	17 47	17 29	17 07	16 55	16 41	16 24	16 04	15 54	15 43	15 30	15 15	14 58
28	18 05	17 48	17 29	17 08	16 56	16 42	16 25	16 04	15 54	15 43	15 31	15 16	14 59
29	18 06	17 48	17 30	17 09	16 56	16 42	16 26	16 05	15 55	15 44	15 32	15 17	15 00
30	18 06	17 49	17 30	17 09	16 57	16 43	16 26	16 06	15 56	15 45	15 33	15 18	15 01
31	18 06	17 49	17 31	17 10	16 58	16 44	16 27	16 07	15 57	15 46	15 34	15 19	15 02
32	18 07	17 50	17 32	17 11	16 59	16 45	16 28	16 08	15 58	15 47	15 35	15 21	15 04

ENDING OF EVENING TWILIGHT.

Nov. 17	h m 19 01	h m 18 48	h m 18 36	h m 18 26	h m 18 21	h m 18 17	h m 18 12	h m 18 07	h m 18 06	h m 18 04	h m 18 02	h m 18 00	h m 17 58
27	19 05	18 50	18 37	18 24	18 18	18 13	18 06	18 00	17 57	17 55	17 52	17 49	17 46
Dec. 7	19 10	18 53	18 39	18 25	18 18	18 12	18 04	17 57	17 54	17 51	17 47	17 43	17 40
17	19 15	18 58	18 42	18 28	18 21	18 14	18 06	17 58	17 55	17 51	17 47	17 43	17 39
27	19 20	19 03	18 48	18 33	18 26	18 19	18 11	18 03	18 00	17 56	17 52	17 48	17 44
32	19 22	19 05	18 50	18 36	18 29	18 22	18 15	18 07	18 04	18 00	17 57	17 53	17 49

SUNRISE AND SUNSET, 1931.

SUNRISE, SUNSET, AND TWILIGHT FOR SOUTHERN LATITUDES, 1931.

In the case of a southern latitude, the time of sunrise, sunset, or beginning or ending of twilight is taken from the main table, with the corresponding northern latitude, not for the given date but for a date about six months earlier or later, which is to be found in the following table. The time taken from the main table must be corrected by the quantity given in the auxiliary table below on the same line as the given date.

Example.—1931, May 5, in latitude -38° , required the times of sunrise, sunset, and beginning and ending of twilight.

The auxiliary table gives November 7 as the corresponding date, northern latitude, while the correction is $+13^m$.

				Beginning of Twilight.	Sunrise.	Sunset.	Ending of Twilight.
				$\begin{smallmatrix} h & m \\ 05 & 01 \end{smallmatrix}$	$\begin{smallmatrix} h & m \\ 06 & 31 \end{smallmatrix}$	$\begin{smallmatrix} h & m \\ 16 & 56 \end{smallmatrix}$	$\begin{smallmatrix} h & m \\ 18 & 25 \end{smallmatrix}$
Main table, Lat. $+38^{\circ}$, Nov. 7	..	..	..	$\begin{smallmatrix} h & m \\ 05 & 01 \end{smallmatrix}$	$\begin{smallmatrix} h & m \\ 06 & 31 \end{smallmatrix}$	$\begin{smallmatrix} h & m \\ 16 & 56 \end{smallmatrix}$	$\begin{smallmatrix} h & m \\ 18 & 25 \end{smallmatrix}$
Auxiliary table	..	..	..	$+13$	$+13$	$+13$	$+13$
Local mean time, May 5	..	..	..	$05 \quad 14$	$06 \quad 44$	$17 \quad 09$	$18 \quad 38$

The periods during which twilight lasts all night in southern latitudes may be found by substituting for the northern latitudes given in the footnotes, pages 644-651, the corresponding southern latitudes, and for the dates given in those footnotes, the corresponding dates taken from the auxiliary table.

Given Date.	Corresponding Date, Northern Latitude.	Correc- tion.	Given Date.	Corresponding Date, Northern Latitude.	Correc- tion.	Given Date.	Corresponding Date, Northern Latitude.	Correc- tion.	Given Date.	Corresponding Date, Northern Latitude.	Correc- tion.
Jan. 1	July 1	-1^m	Feb. 5	Aug. 9	$+9^m$	Mar. 13	Sept. 15	$+14^m$	Apr. 18	Oct. 21	$+15^m$
2	2	0	6	10	9	14	16	14	19	22	15
3	3	0	7	11	9	15	17	14	20	23	15
4	4	0	8	12	9	16	18	15	21	24	14
5	5	0	9	13	9	17	19	15	22	25	14
6	6	0	10	14	$+10$	18	20	$+15$	23	26	$+14$
7	7	$+1$	11	15	10	19	21	15	24	27	14
8	8	1	12	16	10	20	22	15	25	28	14
9	9	1	13	17	10	21	23	15	26	29	14
10	10	2	14	18	10	22	24	15	27	30	14
11	11	2	15	19	$+11$	23	25	$+15$	28	31	$+14$
12	12	2	16	20	11	24	26	15	29	Nov. 1	14
13	13	3	17	21	11	25	27	15	30	2	14
14	14	3	18	22	11	26	28	15	May 1	3	13
15	15	3	19	23	12	27	29	15	2	4	13
16	16	3	20	24	12	28	Oct. 1	$+15$	3	5	$+13$
17	17	$+3$	21	25	$+12$	29	2	15	4	6	13
18	18	4	22	26	12	30	3	15	5	7	13
19	19	4	23	27	12	31	4	15	6	8	13
20	20	4	24	28	12	Apr. 1	5	15	7	9	13
21	21	4	25	29	12	2	6	$+15$	8	10	$+13$
22	22	$+5$	26	30	$+12$	3	7	15	9	11	12
23	23	5	27	31	13	4	8	15	10	12	12
24	24	5	28	Sept. 2	13	5	9	15	11	13	12
25	25	6	Mar. 1	3	13	6	10	15	12	14	12
26	26	$+6$	2	4	$+13$	7	11	$+15$	13	15	$+12$
27	27	6	3	5	13	8	12	15	14	16	12
28	28	6	4	6	13	9	13	15	15	17	11
29	29	7	5	7	14	10	14	15	16	18	11
30	30	7	6	8	14	11	15	15	17	19	11
31	31	$+7$	7	9	$+14$	12	16	$+15$	18	20	11
Feb. 1	1	7	8	10	14	13	17	15	19	21	11
2	2	8	9	11	14	14	18	15	20	22	10
3	3	8	10	12	14	15	19	15	21	23	10
4	4	8	11	13	14	16	20	15	22	24	$+10$
5	5	$+8$	12	14	$+14$	17	21	$+15$	23	25	$+10$

SUNRISE AND SUNSET, 1931.

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SUNRISE, SUNSET, AND TWILIGHT FOR SOUTHERN LATITUDES, 1931.

Given Date.	Corresponding Date, Northern Latitude.	Correc-tion.	Given Date.	Corresponding Date, Northern Latitude.	Correc-tion.	Given Date.	Corresponding Date, Northern Latitude.	Correc-tion.	Given Date.	Corresponding Date, Northern Latitude.	Correc-tion.
May 24	Nov. 25	+10	July 19	Jan. 16	-4	Sept. 13	Mar. 11	-14	Nov. 8	May 6	-13
25	26	10	20	17	4	14	12	14	9	7	13
26	27	9	21	18	4	15	13	14	10	8	12
27	28	9	22	19	4	16	14	14	11	9	12
28	29	9	23	20	5	17	15	15	12	10	12
29	30	+9	24	21	-5	18	16	-15	13	11	-12
30	Dec. 1	8	25	22	5	19	17	15	14	12	12
31	2	8	26	23	6	20	18	15	15	13	12
June 1	3	8	27	24	6	21	19	15	16	14	11
2	4	8	28	25	6	22	20	15	17	15	11
3	5	+7	29	26	-6	23	21	-15	18	17	-11
4	6	7	30	27	7	24	22	15	19	18	11
5	6	7	31	28	7	25	23	15	20	19	11
6	7	7	Aug. 1	29	7	26	24	15	21	20	11
7	8	7	2	30	7	27	25	15	22	21	10
8	9	+7	3	31	-7	28	26	-15	23	22	-10
9	10	6	4	31	8	29	27	15	24	23	10
10	11	6	5	Feb. 1	8	30	27	15	25	24	10
11	12	6	6	2	8	Oct. 1	28	15	26	25	10
12	13	6	7	3	8	2	29	15	27	26	9
13	14	+5	8	4	-8	3	30	-15	28	27	-9
14	15	5	9	5	9	4	31	15	29	28	9
15	16	5	10	6	9	5	Apr. 1	15	30	29	9
16	17	4	11	7	9	6	2	15	Dec. 1	30	8
17	18	4	12	8	9	7	3	15	2	31	8
18	19	+4	13	9	-9	8	4	-15	3	June 1	-8
19	20	4	14	10	10	9	5	15	4	2	8
20	21	3	15	11	10	10	6	15	5	3	7
21	22	3	16	12	10	11	7	15	6	5	7
22	22	3	17	13	10	12	8	15	7	6	7
23	23	+3	18	14	-10	13	10	-15	8	7	-7
24	24	3	19	15	11	14	11	15	9	8	7
25	25	2	20	16	11	15	12	15	10	9	6
26	26	2	21	17	11	16	13	15	11	10	6
27	27	2	22	18	11	17	14	15	12	11	6
28	28	+2	23	18	-11	18	15	-15	13	12	-6
29	29	1	24	19	12	19	16	15	14	13	5
30	30	1	25	20	12	20	17	15	15	14	5
July 1	Dec. 31	1	26	21	12	21	18	15	16	15	5
2	Jan. 1	+1	27	22	12	22	19	15	17	16	4
3	1	0	28	23	-12	23	20	-15	18	17	-4
4	2	0	29	24	12	24	21	14	19	18	4
5	3	0	30	25	13	25	22	14	20	19	4
6	4	0	31	26	13	26	23	14	21	21	3
7	5	-1	Sept. 1	27	13	27	24	14	22	22	3
8	6	-1	2	28	-13	28	25	-14	23	23	-3
9	7	1	3	Mar. 1	13	29	26	14	24	24	3
10	8	2	4	2	13	30	27	14	25	25	2
11	9	2	5	3	13	31	28	14	26	26	2
12	10	2	6	4	13	Nov. 1	29	14	27	27	2
13	11	-2	7	5	-14	2	30	-14	28	28	-2
14	12	3	8	6	14	3	May 1	13	29	29	1
15	13	3	9	7	14	4	2	13	30	30	1
16	14	3	10	8	14	5	3	13	31	July 1	-1
17	15	3	11	9	14	6	4	13	32	2	0
18	15	-3	12	10	-14	7	5	-13			

MOONRISE, 1931.

LOCAL MEAN TIME OF MOONRISE (MOON'S UPPER LIMB),
MERIDIAN OF GREENWICH, 1931.

To obtain standard time see directions under Sunrise and Sunset.

For other longitudes and for southern latitudes see page 676.

Lat.															
Date.		o°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°	
Jan.	0	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	
	1	14 24	14 09	13 53	13 36	13 25	13 13	12 59	12 43	12 35	12 26	12 16	12 05	11 53	
	2	15 16	14 58	14 38	14 16	14 02	13 47	13 29	13 07	12 57	12 45	12 31	12 16	11 57	
	3	16 14	15 53	15 30	15 04	14 48	14 30	14 08	13 41	13 28	13 13	12 55	12 34	12 07	
	4	17 16	16 54	16 29	16 01	15 45	15 25	15 02	14 32	14 17	13 59	13 39	13 13	12 36	
	5	18 21	17 59	17 35	17 08	16 52	16 33	16 10	15 41	15 26	15 09	14 49	14 24	13 50	
	6	19 24	19 04	18 44	18 20	18 06	17 49	17 29	17 04	16 52	16 39	16 23	16 04	15 40	
	7	20 23	20 08	19 52	19 33	19 22	19 09	18 54	18 35	18 26	18 16	18 05	17 52	17 37	
	8	21 18	21 08	20 57	20 44	20 36	20 28	20 18	20 06	20 00	19 54	19 47	19 39	19 30	
	9	22 10	22 04	21 58	21 51	21 48	21 44	21 39	21 33	21 30	21 27	21 24	21 20	21 15	
	10	22 58	22 58	22 57	22 57	22 57	22 57	22 57	22 56	22 56	22 56	22 56	22 56	22 56	
	11	23 45	23 50	23 55	..	..	..	..	..	..	..	..	..	..
	12	..	..	..	00 01	00 04	00 08	00 13	00 18	00 21	00 24	00 27	00 30	00 34
	13	00 33	00 42	00 53	01 04	01 11	01 19	01 28	01 39	01 45	01 50	01 57	02 04	02 12	
	14	01 21	01 35	01 50	02 08	02 18	02 30	02 44	03 00	03 08	03 18	03 28	03 39	03 53	
	15	02 12	02 30	02 50	03 12	03 25	03 40	03 58	04 21	04 32	04 44	04 58	05 15	05 36	
	16	03 06	03 26	03 49	04 15	04 31	04 48	05 10	05 37	05 51	06 06	06 25	06 48	07 17	
	17	04 00	04 23	04 47	05 15	05 32	05 51	06 14	06 45	07 00	07 17	07 39	08 06	08 44	
	18	04 55	05 18	05 42	06 10	06 26	06 46	07 09	07 39	07 54	08 12	08 32	08 59	09 35	
	19	05 49	06 10	06 32	06 58	07 14	07 32	07 53	08 20	08 33	08 48	09 06	09 28	09 55	
	20	06 39	06 58	07 18	07 40	07 54	08 09	08 27	08 50	09 00	09 13	09 26	09 42	10 02	
	21	07 26	07 42	07 58	08 16	08 27	08 39	08 54	09 11	09 20	09 29	09 39	09 51	10 04	
	22	08 10	08 21	08 34	08 48	08 56	09 05	09 15	09 28	09 34	09 41	09 48	09 56	10 05	
	23	08 51	08 59	09 07	09 16	09 21	09 27	09 34	09 42	09 45	09 49	09 54	09 59	10 04	
	24	09 30	09 34	09 38	09 42	09 44	09 47	09 49	09 53	09 55	09 57	09 59	10 01	10 04	
	25	10 09	10 09	10 08	10 07	10 06	10 06	10 05	10 05	10 04	10 04	10 04	10 03	10 02	
	26	10 49	10 44	10 39	10 33	10 30	10 26	10 22	10 16	10 14	10 11	10 08	10 05	10 02	
	27	11 30	11 21	11 11	11 00	10 54	10 47	10 39	10 29	10 24	10 20	10 14	10 08	10 01	
	28	12 14	12 01	11 47	11 31	11 22	11 11	10 59	10 44	10 38	10 30	10 22	10 12	10 01	
	29	13 03	12 46	12 28	12 07	11 55	11 41	11 25	11 05	10 55	10 45	10 33	10 19	10 03	
	30	13 56	13 36	13 15	12 50	12 35	12 18	11 58	11 33	11 21	11 07	10 51	10 32	10 09	
Feb.	31	14 56	14 33	14 09	13 42	13 25	13 06	12 43	12 14	12 00	11 43	11 23	10 59	10 26	
	1	15 58	15 36	15 11	14 43	14 26	14 07	13 43	13 13	12 58	12 40	12 19	11 51	11 14	
	2	17 02	16 42	16 19	15 53	15 37	15 19	14 58	14 30	14 17	14 01	13 42	13 20	12 50	
	3	18 05	17 47	17 29	17 07	16 54	16 39	16 22	16 00	15 49	15 37	15 24	15 08	14 48	
	4	19 04	18 51	18 37	18 21	18 12	18 00	17 49	17 34	17 26	17 18	17 09	16 59	16 47	
	5	19 58	19 51	19 42	19 33	19 28	19 21	19 14	19 06	19 02	18 57	18 52	18 46	18 40	
	6	20 50	20 47	20 45	20 42	20 41	20 39	20 37	20 34	20 33	20 32	20 30	20 29	20 27	
	7	21 39	21 42	21 45	21 49	21 51	21 54	21 57	22 00	22 02	22 04	22 06	22 08	22 10	
	8	22 28	22 36	22 44	22 55	23 01	23 07	23 15	23 24	23 29	23 34	23 39	23 46	23 52	
	9	23 18	23 31	23 44	..	..	..	..	..	..	..	..	..	..
	10	..	..	..	00 00	00 09	00 20	00 33	00 48	00 55	01 04	01 13	01 23	01 35
	11	00 09	00 26	00 44	01 05	01 18	01 32	01 49	02 11	02 21	02 32	02 46	03 01	03 20	
	12	01 02	01 22	01 44	02 09	02 24	02 41	03 02	03 29	03 42	03 57	04 14	04 36	05 03	
	13	01 56	02 18	02 42	03 10	03 27	03 46	04 10	04 40	04 54	05 12	05 33	06 00	06 38	
	14	02 51	03 14	03 38	04 07	04 23	04 43	05 07	05 38	05 53	06 11	06 32	07 00	07 40	
	15	03 44	04 06	04 30	04 56	05 12	05 31	05 53	06 22	06 36	06 52	07 11	07 34	08 05	
	16	04 35	04 55	05 16	05 40	05 54	06 10	06 30	06 54	07 06	07 18	07 34	07 52	08 13	
	17	05 23	05 40	05 57	06 17	06 29	06 42	06 58	07 17	07 26	07 36	07 48	08 01	08 16	

MOONSET, 1931.

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LOCAL MEAN TIME OF MOONSET (MOON'S UPPER LIMB),
MERIDIAN OF GREENWICH, 1931.

To obtain standard time see directions under Sunrise and Sunset.
For other longitudes and for southern latitudes see page 676.

Lat.	Date.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
Jan.	0	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
	01	59	02 12	02 26	02 42	02 51	03 02	03 14	03 29	03 36	03 44	03 53	04 04	04 15
	1	02 49	03 06	03 24	03 45	03 57	04 11	04 28	04 49	04 59	05 10	05 23	05 39	05 57
	2	03 43	04 03	04 25	04 50	05 05	05 22	05 43	06 10	06 22	06 37	06 54	07 16	07 42
	3	04 44	05 06	05 30	05 58	06 14	06 33	06 56	07 26	07 41	07 58	08 19	08 45	09 21
	4	05 47	06 10	06 34	07 02	07 18	07 37	08 01	08 30	08 45	09 02	09 22	09 48	10 22
	5	06 51	07 12	07 34	08 00	08 14	08 32	08 52	09 18	09 31	09 45	10 02	10 21	10 45
	6	07 53	08 10	08 28	08 49	09 02	09 16	09 32	09 52	10 02	10 12	10 24	10 38	10 54
	7	08 50	09 03	09 16	09 32	09 41	09 51	10 02	10 16	10 23	10 30	10 38	10 47	10 57
	8	09 43	09 51	09 59	10 08	10 14	10 20	10 27	10 35	10 39	10 43	10 48	10 53	10 58
	9	10 33	10 35	10 38	10 42	10 43	10 46	10 48	10 51	10 52	10 53	10 55	10 57	10 58
	10	11 20	11 18	11 16	11 13	11 11	11 10	11 08	11 05	11 04	11 03	11 01	11 00	10 58
	11	12 08	12 00	11 53	11 44	11 39	11 34	11 27	11 20	11 16	11 12	11 08	11 03	10 58
	12	12 56	12 44	12 32	12 17	12 09	12 00	11 49	11 36	11 30	11 23	11 16	11 07	10 58
	13	13 46	13 30	13 13	12 53	12 42	12 29	12 14	12 05	11 56	11 47	11 37	11 26	11 14
	14	14 38	14 18	13 58	13 34	13 20	13 04	12 45	12 21	12 10	11 57	11 42	11 24	11 04
	15	15 32	15 10	14 47	14 20	14 04	13 46	13 24	12 56	12 42	12 26	12 07	11 44	11 14
	16	16 27	16 05	15 40	15 12	14 55	14 36	14 12	13 42	13 27	13 09	12 48	12 21	11 42
	17	17 22	17 00	16 36	16 08	15 52	15 33	15 10	14 40	14 25	14 08	13 48	13 22	12 46
	18	18 14	17 54	17 32	17 07	16 52	16 35	16 14	15 48	15 35	15 20	15 03	14 42	14 15
	19	19 02	18 45	18 27	18 06	17 53	17 39	17 22	17 00	16 50	16 38	16 25	16 09	15 51
	20	19 48	19 34	19 20	19 03	18 53	18 42	18 29	18 13	18 05	17 56	17 47	17 36	17 23
	21	20 30	20 21	20 10	19 59	19 52	19 44	19 34	19 23	19 18	19 12	19 06	18 59	18 50
	22	21 10	21 05	20 59	20 52	20 48	20 44	20 39	20 32	20 29	20 26	20 23	20 19	20 14
	23	21 40	21 48	21 47	21 45	21 44	21 43	21 42	21 40	21 39	21 38	21 38	21 37	21 35
	24	22 28	22 31	22 34	22 38	22 40	22 42	22 44	22 48	22 50	22 51	22 52	22 54	22 57
	25	23 08	23 16	23 23	23 32	23 36	23 42	23 49	23 57	..	..	..	..	..
	26	23 51	..	..	..	..	..	..	..	00 01	00 05	00 09	00 14	00 20
	27	..	00 02	00 14	00 28	00 36	00 45	00 56	01 09	01 15	01 22	01 30	01 38	01 48
	28	00 37	00 52	01 08	01 27	01 38	01 51	02 06	02 25	02 34	02 42	02 55	03 08	03 22
	29	01 28	01 47	02 07	02 30	02 44	03 00	03 19	03 44	03 55	04 08	04 24	04 42	05 05
Feb.	30	02 24	02 46	03 09	03 36	03 52	04 10	04 33	05 02	05 16	05 32	05 52	06 16	06 48
	31	03 25	03 48	04 12	04 41	04 57	05 17	05 41	06 11	06 27	06 44	07 06	07 33	08 11
	1	04 29	04 51	05 14	05 42	05 58	06 16	06 39	07 07	07 21	07 37	07 56	08 19	08 48
	2	05 32	05 52	06 12	06 36	06 49	07 05	07 24	07 47	07 58	08 11	08 25	08 42	09 02
	3	06 33	06 48	07 04	07 23	07 33	07 45	07 59	08 16	08 24	08 33	08 43	08 54	09 07
	4	07 30	07 40	07 51	08 03	08 10	08 18	08 27	08 38	08 42	08 48	08 54	09 01	09 08
	5	08 23	08 28	08 33	08 38	08 42	08 46	08 50	08 55	08 57	09 00	09 02	09 05	09 09
	6	09 13	09 13	09 12	09 12	09 11	09 11	09 11	09 10	09 10	09 10	09 09	09 09	09 08
	7	10 02	09 56	09 51	09 44	09 40	09 36	09 31	09 25	09 22	09 19	09 16	09 12	09 08
	8	10 51	10 41	10 30	10 17	10 10	10 02	09 52	09 41	09 35	09 30	09 23	09 16	09 08
	9	11 42	11 27	11 11	10 53	10 42	10 30	10 16	09 59	09 52	09 42	09 33	09 21	09 08
	10	12 34	12 15	11 56	11 33	11 19	11 04	10 46	10 23	10 12	10 00	09 47	09 30	09 11
	11	13 28	13 07	12 44	12 18	12 02	11 44	11 22	11 05	10 42	10 26	10 08	09 46	09 18
	12	14 23	14 00	13 36	13 08	12 51	12 31	12 08	11 37	11 22	11 05	10 43	10 17	09 39
	13	15 17	14 55	14 30	14 02	13 46	13 26	13 02	12 32	12 17	11 59	11 38	11 10	10 31
	14	16 10	15 49	15 26	15 00	14 44	14 26	14 05	13 37	13 23	13 08	12 49	12 26	11 56
	15	16 59	16 41	16 21	15 58	15 45	15 30	15 11	14 48	14 37	14 24	14 10	13 52	13 31
	16	17 45	17 31	17 15	16 56	16 46	16 33	16 18	16 00	15 52	15 42	15 32	15 19	15 04

MOONRISE, 1931.

LOCAL MEAN TIME OF MOONRISE (MOON'S UPPER LIMB),
MERIDIAN OF GREENWICH, 1931.

To obtain standard time see directions under Sunrise and Sunset.

For other longitudes and for southern latitudes see page 676.

Lat.															
Date.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°		
Feb.	15	04 35	04 55	05 16	05 40	05 54	06 10	06 30	06 54	07 06	07 18	07 34	07 52	08 13	
	16	05 23	05 40	05 57	06 17	06 29	06 42	06 58	07 17	07 26	07 36	07 48	08 01	08 16	
	17	06 08	06 20	06 34	06 50	06 59	07 09	07 21	07 35	07 42	07 49	07 57	08 06	08 17	
	18	06 50	06 58	07 08	07 18	07 24	07 32	07 40	07 49	07 54	07 58	08 04	08 10	08 16	
	19	07 30	07 34	07 39	07 45	07 48	07 52	07 56	08 01	08 04	08 06	08 09	08 12	08 16	
	20	08 08	08 09	08 10	08 10	08 11	08 11	08 12	08 12	08 13	08 13	08 13	08 14	08 14	
	21	08 47	08 44	08 40	08 36	08 33	08 30	08 27	08 24	08 22	08 20	08 18	08 16	08 13	
	22	09 27	09 20	09 11	09 02	08 57	08 51	08 44	08 35	08 32	08 27	08 23	08 18	08 11	
	23	10 10	09 58	09 45	09 31	09 23	09 13	09 02	08 49	08 43	08 36	08 29	08 21	08 12	
	24	10 55	10 40	10 23	10 04	09 52	09 40	09 25	09 07	08 58	08 49	08 38	08 26	08 12	
	25	11 45	11 26	11 06	10 42	10 28	10 13	09 54	09 30	09 19	09 07	08 52	08 35	08 15	
	26	12 40	12 19	11 55	11 28	11 13	10 54	10 32	10 04	09 50	09 35	09 16	08 54	08 24	
	27	13 40	13 17	12 52	12 24	12 07	11 47	11 23	10 53	10 37	10 20	09 58	09 31	08 52	
	28	14 42	14 20	13 56	13 28	13 12	12 52	12 29	11 59	11 45	11 28	11 07	10 41	10 05	
	Mar.	1	15 44	15 24	15 03	14 39	14 24	14 06	13 47	13 22	13 10	12 56	12 39	12 19	11 55
		2	16 44	16 28	16 11	15 52	15 41	15 28	15 12	14 54	14 44	14 34	14 23	14 10	13 54
		3	17 40	17 30	17 18	17 06	16 58	16 49	16 39	16 27	16 21	16 15	16 08	16 00	15 51
		4	18 34	18 29	18 24	18 18	18 14	18 10	18 05	17 59	17 56	17 54	17 50	17 47	17 43
		5	19 26	19 26	19 26	19 27	19 27	19 28	19 28	19 29	19 29	19 29	19 30	19 30	19 30
		6	20 16	20 22	20 28	20 36	20 40	20 45	20 50	20 57	21 00	21 04	21 08	21 12	21 17
		7	21 08	21 19	21 30	21 44	21 52	22 01	22 12	22 25	22 31	22 38	22 45	22 54	23 04
		8	22 00	22 16	22 33	22 52	23 04	23 17	23 32	23 52
		9	22 54	23 14	23 35	23 59	00 01	00 11	00 23	00 36	00 52
		10	23 50	00 13	00 30	00 50	01 15	01 28	01 41	01 57	02 17	02 42
11		..	00 12	00 36	01 03	01 19	01 38	02 01	02 31	02 46	03 03	03 23	03 49	04 25	
12		00 46	01 09	01 33	02 02	02 19	02 39	03 03	03 34	03 50	04 08	04 30	04 59	05 42	
13		01 40	02 03	02 27	02 55	03 11	03 30	03 54	04 23	04 38	04 55	05 15	05 41	06 16	
14		02 32	02 52	03 15	03 40	03 55	04 12	04 33	04 58	05 11	05 25	05 42	06 02	06 26	
15		03 21	03 38	03 57	04 19	04 31	04 46	05 03	05 24	05 34	05 45	05 58	06 12	06 29	
16		04 06	04 20	04 35	04 52	05 02	05 14	05 27	05 43	05 50	05 58	06 06	06 18	06 30	
17		04 49	04 59	05 10	05 22	05 29	05 37	05 46	05 58	06 03	06 08	06 15	06 22	06 30	
18		05 29	05 35	05 42	05 49	05 53	05 58	06 03	06 10	06 13	06 16	06 20	06 24	06 28	
19		06 08	06 10	06 12	06 14	06 16	06 17	06 19	06 21	06 22	06 23	06 24	06 26	06 27	
20		06 47	06 45	06 42	06 40	06 38	06 36	06 34	06 32	06 31	06 30	06 28	06 27	06 25	
21		07 27	07 20	07 13	07 06	07 01	06 56	06 50	06 44	06 40	06 37	06 33	06 29	06 24	
22		08 08	07 58	07 46	07 34	07 26	07 18	07 08	06 56	06 51	06 45	06 39	06 31	06 23	
23		08 53	08 38	08 23	08 05	07 55	07 43	07 29	07 12	07 05	06 56	06 46	06 36	06 23	
24		09 41	09 23	09 03	08 41	08 28	08 13	07 55	07 34	07 23	07 12	06 58	06 43	06 25	
25	10 33	10 12	09 50	09 24	09 08	08 51	08 30	08 03	07 50	07 35	07 18	06 57	06 31		
26	11 30	11 07	10 43	10 14	09 58	09 38	09 14	08 44	08 29	08 12	07 51	07 25	06 48		
27	12 29	12 06	11 42	11 13	10 56	10 37	10 13	09 42	09 27	09 09	08 47	08 19	07 39		
28	13 29	13 08	12 45	12 19	12 04	11 45	11 24	10 56	10 42	10 26	10 08	09 45	09 15		
29	14 28	14 10	13 49	13 29	13 16	13 01	12 43	12 21	12 11	11 58	11 45	11 28	11 09		
30	15 24	15 10	14 56	14 40	14 31	14 20	14 07	13 51	13 44	13 36	13 26	13 16	13 04		
31	16 18	16 10	16 01	15 51	15 45	15 39	15 31	15 22	15 18	15 13	15 08	15 02	14 55		
Apr.	1	17 09	17 07	17 04	17 01	16 59	16 57	16 55	16 52	16 51	16 49	16 48	16 46	16 44	
	2	18 01	18 04	18 07	18 10	18 12	18 15	18 18	18 21	18 23	18 24	18 26	18 28	18 31	

MOONSET, 1931.

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LOCAL MEAN TIME OF MOONSET (MOON'S UPPER LIMB),
MERIDIAN OF GREENWICH, 1931.

To obtain standard time see directions under Sunrise and Sunset.
For other longitudes and for southern latitudes see page 676.

Lat.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
Date.													
Feb. 15	h m 16 59	h m 16 41	h m 16 21	h m 15 58	h m 15 45	h m 15 30	h m 15 11	h m 14 48	h m 14 37	h m 14 24	h m 14 10	h m 13 52	h m 13 31
16	17 45	17 31	17 15	16 56	16 46	16 33	16 18	16 00	15 52	15 42	15 32	15 19	15 04
17	18 28	18 17	18 06	17 52	17 44	17 35	17 25	17 12	17 06	16 59	16 52	16 43	16 34
18	19 09	19 02	18 55	18 46	18 42	18 36	18 29	18 22	18 18	18 14	18 09	18 04	17 59
19	19 48	19 46	19 43	19 39	19 37	19 35	19 33	19 30	19 28	19 27	19 25	19 23	19 21
20	20 27	20 29	20 30	20 32	20 33	20 34	20 36	20 37	20 38	20 39	20 40	20 41	20 42
21	21 06	21 12	21 18	21 25	21 29	21 34	21 40	21 46	21 49	21 52	21 56	22 00	22 04
22	21 48	21 57	22 08	22 20	22 27	22 36	22 45	22 56	23 02	23 08	23 14	23 21	23 30
23	22 31	22 45	23 00	23 17	23 27	23 39	23 53	..	..	..	..	..	..
24	23 19	23 37	23 56	..	..	..	..	00 10	00 18	00 26	00 36	00 48	01 01
25	..	..	..	00 18	00 30	00 46	01 03	01 26	01 36	01 48	02 02	02 19	02 38
26	00 11	00 32	00 54	01 20	01 36	01 53	02 15	02 42	02 56	03 11	03 29	03 51	04 20
27	01 08	01 31	01 55	02 23	02 40	03 00	03 24	03 54	04 09	04 27	04 48	05 16	05 54
28	02 09	02 32	02 56	03 25	03 41	04 01	04 24	04 55	05 10	05 27	05 48	06 14	06 51
Mar. 1	03 11	03 32	03 55	04 21	04 36	04 53	05 14	05 41	05 53	06 08	06 25	06 45	07 10
2	04 12	04 30	04 49	05 10	05 22	05 37	05 53	06 14	06 24	06 34	06 47	07 01	07 17
3	05 11	05 24	05 38	05 53	06 02	06 12	06 24	06 39	06 45	06 52	07 00	07 10	07 20
4	06 06	06 14	06 22	06 31	06 36	06 42	06 49	06 57	07 01	07 05	07 09	07 14	07 20
5	06 58	07 01	07 03	07 06	07 07	07 09	07 11	07 13	07 14	07 15	07 17	07 18	07 20
6	07 50	07 46	07 43	07 39	07 37	07 35	07 32	07 28	07 27	07 25	07 23	07 21	07 19
7	08 40	08 32	08 23	08 13	08 08	08 01	07 53	07 44	07 40	07 35	07 30	07 24	07 18
8	09 32	09 19	09 05	08 49	08 40	08 29	08 17	08 02	07 55	07 47	07 39	07 29	07 18
9	10 26	10 08	09 50	09 29	09 16	09 02	08 45	08 24	08 14	08 04	07 51	07 36	07 20
10	11 21	11 00	10 38	10 13	09 58	09 40	09 20	08 53	08 41	08 26	08 10	07 49	07 24
11	12 17	11 54	11 30	11 02	10 46	10 26	10 03	09 33	09 18	09 01	08 40	08 14	07 38
12	13 13	12 50	12 25	11 57	11 40	11 20	10 56	10 24	10 09	09 51	09 28	09 00	08 18
13	14 06	13 44	13 21	12 54	12 38	12 19	11 56	11 27	11 13	10 56	10 36	10 11	09 37
14	14 56	14 37	14 16	13 52	13 38	13 22	13 02	12 37	12 25	12 11	11 55	11 36	11 12
15	15 43	15 27	15 10	14 50	14 39	14 25	14 09	13 49	13 40	13 29	13 17	13 03	12 47
16	16 27	16 15	16 02	15 47	15 38	15 28	15 16	15 01	14 54	14 47	14 38	14 28	14 17
17	17 08	17 00	16 52	16 41	16 36	16 29	16 21	16 11	16 07	16 02	15 56	15 51	15 44
18	17 48	17 44	17 40	17 35	17 32	17 28	17 25	17 20	17 18	17 16	17 13	17 10	17 07
19	18 27	18 27	18 28	18 28	18 28	18 28	18 28	18 28	18 28	18 28	18 28	18 28	18 29
20	19 06	19 10	19 15	19 21	19 24	19 27	19 32	19 36	19 39	19 41	19 44	19 47	19 51
21	19 47	19 55	20 04	20 15	20 21	20 28	20 36	20 46	20 51	20 56	21 02	21 08	21 15
22	20 29	20 42	20 56	21 12	21 21	21 32	21 44	21 59	22 06	22 14	22 23	22 33	22 45
23	21 16	21 32	21 50	22 11	22 23	22 37	22 53	23 14	23 24	23 35	23 48	..	..
24	22 06	22 26	22 47	23 12	23 26	23 44	..	..	..	..	..	00 02	00 20
25	23 00	23 22	23 46	..	..	..	00 04	00 30	00 42	00 57	01 14	01 34	02 00
26	23 58	..	..	00 14	00 30	00 49	01 13	01 42	02 01	02 15	02 35	03 02	03 38
27	..	00 21	00 46	01 14	01 31	01 51	02 15	02 46	03 01	03 19	03 41	04 09	04 50
28	00 58	01 20	01 43	02 10	02 27	02 45	03 08	03 36	03 50	04 06	04 25	04 48	05 19
29	01 57	02 16	02 37	03 01	03 15	03 31	03 49	04 13	04 24	04 37	04 51	05 08	05 28
30	02 54	03 10	03 26	03 45	03 56	04 08	04 22	04 39	04 48	04 57	05 07	05 18	05 31
31	03 50	04 00	04 11	04 24	04 31	04 39	04 49	05 00	05 05	05 11	05 17	05 24	05 32
Apr. 1	04 42	04 47	04 53	04 59	05 03	05 07	05 11	05 17	05 19	05 22	05 25	05 28	05 32
2	05 33	05 33	05 33	05 33	05 32	05 32	05 32	05 32	05 32	05 32	05 31	05 31	05 31

MOONRISE, 1931.

LOCAL MEAN TIME OF MOONRISE (MOON'S UPPER LIMB),
MERIDIAN OF GREENWICH, 1931.

To obtain standard time see directions under Sunrise and Sunset.
For other longitudes and for southern latitudes see page 676.

Lat.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
Date.													
Apr. 1	17 09	17 07	17 04	17 01	16 59	16 57	16 55	16 52	16 51	16 49	16 48	16 46	16 44
2	18 01	18 04	18 07	18 10	18 12	18 15	18 18	18 21	18 23	18 24	18 26	18 28	18 31
3	18 52	19 00	19 09	19 20	19 26	19 33	19 41	19 50	19 55	19 59	20 06	20 12	20 19
4	19 45	19 59	20 13	20 30	20 40	20 51	21 04	21 20	21 28	21 36	21 46	21 57	22 10
5	20 41	20 58	21 17	21 39	21 53	22 08	22 26	22 49	23 00	23 12	23 26	23 43	..
6	21 38	21 59	22 21	22 48	23 03	23 22	23 44	..	..	..	..	..	00 03
7	22 36	22 58	23 23	23 51	..	..	..	00 12	00 26	00 42	01 01	01 24	01 55
8	23 32	23 55	..	..	00 08	00 28	00 52	01 23	01 39	01 57	02 19	02 48	03 30
9	..	..	00 20	00 48	01 05	01 25	01 49	02 20	02 35	02 53	03 14	03 42	04 21
10	00 26	00 48	01 11	01 37	01 53	02 11	02 33	03 00	03 13	03 29	03 47	04 09	04 37
11	01 17	01 35	01 55	02 18	02 32	02 47	03 05	03 28	03 39	03 51	04 05	04 22	04 41
12	02 04	02 19	02 36	02 54	03 05	03 17	03 32	03 49	03 58	04 07	04 18	04 29	04 43
13	02 47	02 59	03 11	03 25	03 33	03 42	03 53	04 06	04 12	04 18	04 25	04 33	04 43
14	03 28	03 36	03 44	03 53	03 58	04 04	04 10	04 19	04 22	04 26	04 31	04 36	04 42
15	04 07	04 11	04 14	04 18	04 21	04 23	04 26	04 30	04 32	04 34	04 35	04 38	04 40
16	04 46	04 45	04 45	04 44	04 43	04 42	04 42	04 41	04 41	04 40	04 40	04 39	04 39
17	05 26	05 21	05 15	05 09	05 06	05 02	04 58	04 52	04 50	04 47	04 44	04 41	04 37
18	06 07	05 58	05 48	05 37	05 30	05 23	05 15	05 04	05 00	04 55	04 49	04 43	04 36
19	06 51	06 37	06 23	06 07	05 58	05 47	05 34	05 20	05 13	05 05	04 56	04 47	04 36
20	07 38	07 21	07 03	06 42	06 30	06 16	05 59	05 39	05 30	05 19	05 07	04 53	04 37
21	08 30	08 09	07 48	07 22	07 07	06 51	06 31	06 06	05 53	05 39	05 24	05 04	04 41
22	09 25	09 02	08 38	08 11	07 54	07 35	07 12	06 43	06 28	06 12	05 52	05 27	04 54
23	10 23	10 00	09 35	09 07	08 50	08 30	08 06	07 35	07 20	07 01	06 40	06 12	05 31
24	11 22	11 00	10 36	10 09	09 53	09 34	09 12	08 43	08 28	08 12	07 52	07 27	06 54
25	12 19	12 00	11 40	11 16	11 02	10 46	10 27	10 03	09 51	09 38	09 22	09 04	08 41
26	13 14	12 58	12 44	12 25	12 14	12 02	11 47	11 29	11 20	11 10	11 00	10 47	10 32
27	14 07	13 57	13 46	13 34	13 26	13 18	13 08	12 56	12 51	12 44	12 38	12 30	12 21
28	14 58	14 53	14 47	14 41	14 37	14 33	14 29	14 23	14 20	14 18	14 14	14 11	14 07
29	15 48	15 48	15 48	15 49	15 49	15 49	15 49	15 50	15 50	15 50	15 50	15 50	15 51
30	16 38	16 43	16 49	16 56	17 00	17 05	17 10	17 17	17 19	17 23	17 27	17 31	17 36
May 1	17 29	17 40	17 52	18 05	18 13	18 22	18 32	18 45	18 51	18 58	19 06	19 14	19 24
2	18 24	18 39	18 56	19 16	19 27	19 40	19 56	20 15	20 24	20 35	20 46	21 00	21 16
3	19 21	19 40	20 01	20 26	20 40	20 57	21 17	21 43	21 55	22 09	22 26	22 46	23 11
4	20 20	20 42	21 06	21 33	21 50	22 09	22 32	23 02	23 17	23 34	23 56	..	..
5	21 19	21 42	22 06	22 35	22 52	23 12	23 36	..	..	..	..	00 22	00 59
6	22 16	22 38	23 02	23 29	23 45	..	..	00 08	00 23	00 42	01 04	01 32	02 15
7	23 09	23 29	23 50	..	..	00 04	00 27	00 56	01 10	01 27	01 46	02 11	02 43
8	23 58	..	..	00 14	00 29	00 45	01 05	01 30	01 42	01 55	02 11	02 29	02 52
9	..	00 15	00 32	00 53	01 05	01 18	01 34	01 54	02 04	02 14	02 25	02 38	02 54
10	00 43	00 56	01 10	01 26	01 35	01 45	01 57	02 12	02 18	02 26	02 34	02 44	02 54
11	01 25	01 34	01 44	01 54	02 01	02 07	02 16	02 26	02 30	02 35	02 41	02 47	02 54
12	02 05	02 10	02 15	02 21	02 24	02 28	02 32	02 38	02 40	02 43	02 46	02 49	02 52
13	02 44	02 45	02 46	02 46	02 47	02 48	02 48	02 49	02 49	02 50	02 50	02 51	02 51
14	03 23	03 19	03 16	03 12	03 09	03 07	03 04	03 03	03 02	03 02	03 02	03 02	03 02
15	04 04	03 56	03 48	03 38	03 33	03 27	03 20	03 12	03 08	03 04	02 59	02 54	02 49
16	04 47	04 35	04 22	04 08	04 00	03 50	03 39	03 26	03 20	03 13	03 06	02 58	02 48
17	05 33	05 18	05 01	04 41	04 30	04 18	04 02	03 44	03 36	03 26	03 15	03 03	02 49
18	06 24	06 05	05 44	05 21	05 07	04 51	04 32	04 08	03 57	03 44	03 30	03 12	02 52

MOONSET, 1931.

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LOCAL MEAN TIME OF MOONSET (MOON'S UPPER LIMB),
MERIDIAN OF GREENWICH, 1931.

To obtain standard time see directions under Sunrise and Sunset.

For other longitudes and for southern latitudes see page 676.

Lat.		0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
Date.														
Apr.	1	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
	2	04 42	04 47	04 53	04 59	05 03	05 07	05 11	05 17	05 19	05 22	05 25	05 28	05 32
	3	05 33	05 33	05 33	05 33	05 32	05 32	05 32	05 32	05 32	05 32	05 31	05 31	05 31
	4	06 25	06 19	06 13	06 06	06 02	05 58	05 53	05 47	05 44	05 41	05 38	05 34	05 30
	5	07 17	07 06	06 55	06 42	06 34	06 26	06 16	06 04	05 58	05 52	05 46	05 38	05 30
	6	08 11	07 56	07 39	07 20	07 09	06 57	06 42	06 24	06 16	06 06	05 56	05 44	05 30
	7	09 08	08 48	08 27	08 04	07 50	07 33	07 14	06 50	06 39	06 26	06 11	05 54	05 32
	8	10 06	09 44	09 20	08 53	08 36	08 18	07 55	07 26	07 12	06 56	06 36	06 12	05 41
	9	11 03	10 40	10 16	09 47	09 30	09 10	08 46	08 14	07 59	07 40	07 18	06 49	06 07
	10	12 51	12 31	12 09	11 44	11 29	11 12	10 51	10 24	10 11	09 56	09 38	09 17	08 49
	11	13 40	13 23	13 04	12 43	12 30	12 16	11 58	11 37	11 26	11 15	11 01	10 46	10 26
	12	14 25	14 12	13 57	13 40	13 30	13 19	13 06	12 49	12 42	12 33	12 23	12 12	11 59
	13	15 07	14 58	14 47	14 36	14 28	14 20	14 11	14 00	13 55	13 49	13 43	13 35	13 27
	14	15 47	15 42	15 36	15 29	15 25	15 21	15 15	15 09	15 06	15 03	14 59	14 56	14 51
	15	16 26	16 25	16 24	16 22	16 21	16 20	16 19	16 17	16 16	16 16	16 15	16 14	16 13
	16	17 05	17 08	17 12	17 15	17 17	17 20	17 22	17 26	17 27	17 29	17 31	17 33	17 35
	17	17 46	17 53	18 00	18 06	18 14	18 20	18 27	18 35	18 39	18 43	18 48	18 53	18 59
	18	18 28	18 39	18 52	19 09	19 14	19 23	19 34	19 48	19 54	20 01	20 09	20 17	20 28
	19	19 13	19 29	19 45	20 04	20 16	20 28	20 44	21 02	21 12	21 22	21 33	21 46	22 02
	20	20 02	20 22	20 42	21 05	21 19	21 36	21 55	22 19	22 31	22 44	23 00	23 18	23 41
	21	20 56	21 17	21 41	22 08	22 24	22 42	23 05	23 34	23 48	..	..	..	..
	22	21 52	22 15	22 40	23 08	23 25	23 45	..	..	..	00 04	00 24	00 49	01 22
	23	22 51	23 14	23 38	..	..	..	00 09	00 40	00 56	01 14	01 36	02 04	02 45
	24	23 49	..	..	00 06	00 22	00 41	01 04	01 34	01 48	02 05	02 26	02 51	03 25
	25	..	00 10	00 31	00 57	01 11	01 28	01 48	02 14	02 26	02 40	02 56	03 15	03 38
	26	00 46	01 03	01 21	01 41	01 53	02 07	02 23	02 42	02 52	03 02	03 14	03 27	03 43
	27	01 40	01 52	02 06	02 21	02 29	02 39	02 51	03 04	03 11	03 18	03 25	03 34	03 44
	28	02 31	02 39	02 47	02 56	03 03	03 07	03 14	03 22	03 25	03 29	03 34	03 39	03 44
	29	03 21	03 24	03 26	03 29	03 30	03 32	03 34	03 37	03 38	03 39	03 40	03 42	03 43
	30	04 11	04 08	04 05	04 02	04 00	03 57	03 54	03 51	03 50	03 48	03 46	03 44	03 42
May	1	05 02	04 54	04 45	04 35	04 30	04 23	04 16	04 07	04 03	03 58	03 53	03 48	03 42
	2	05 55	05 42	05 28	05 12	05 02	04 52	04 40	04 25	04 18	04 10	04 02	03 52	03 42
	3	06 50	06 33	06 14	05 53	05 40	05 26	05 09	04 48	04 38	04 27	04 14	04 00	03 43
	4	07 49	07 28	07 06	06 40	06 24	06 07	05 46	05 19	05 06	04 52	04 35	04 14	03 48
	5	08 48	08 26	08 01	07 33	07 16	06 57	06 33	06 02	05 47	05 30	05 08	04 42	04 04
	6	09 47	09 24	08 59	08 31	08 14	07 54	07 30	06 59	06 43	06 25	06 03	05 35	04 53
	7	10 42	10 19	09 58	09 32	09 16	08 57	08 35	08 07	07 53	07 37	07 17	06 54	06 22
	8	11 33	11 15	10 55	10 32	10 18	10 03	09 44	09 20	09 09	08 56	08 41	08 23	08 01
	9	12 20	12 06	11 49	11 31	11 20	11 07	10 53	10 34	10 26	10 16	10 05	09 52	09 37
	10	13 04	12 53	12 41	12 27	12 19	12 10	11 59	11 46	11 40	11 33	11 26	11 17	11 08
	11	13 45	13 38	13 30	13 22	13 17	13 11	13 04	12 56	12 52	12 48	12 44	12 39	12 33
	12	14 24	14 21	14 18	14 15	14 13	14 10	14 08	14 04	14 03	14 02	14 00	13 58	13 55
	13	15 03	15 04	15 06	15 08	15 09	15 10	15 11	15 12	15 13	15 14	15 15	15 16	15 17
	14	15 43	15 48	15 54	16 01	16 05	16 10	16 15	16 22	16 24	16 28	16 31	16 36	16 40
	15	16 24	16 34	16 45	16 57	17 04	17 12	17 22	17 33	17 39	17 44	17 51	17 58	18 07
	16	17 09	17 23	17 38	17 55	18 05	18 17	18 31	18 48	18 56	19 04	19 14	19 26	19 39
	17	17 57	18 15	18 34	18 56	19 09	19 24	19 42	20 05	20 16	20 28	20 42	20 58	21 18
	18	18 50	19 11	19 33	19 59	20 15	20 32	20 54	21 22	21 35	21 50	22 09	22 31	23 01

MOONRISE, 1931.

LOCAL MEAN TIME OF MOONRISE (MOON'S UPPER LIMB),
MERIDIAN OF GREENWICH, 1931.

To obtain standard time see directions under Sunrise and Sunset.
For other longitudes and for southern latitudes see page 676.

Lat.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
Date.													
May 17	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
18	05 33	05 18	05 01	04 41	04 30	04 18	04 02	03 44	03 36	03 26	03 15	03 03	02 49
19	06 24	06 05	05 44	05 21	05 07	04 51	04 32	04 08	03 57	03 44	03 30	03 12	02 52
20	07 19	06 57	06 34	06 07	05 51	05 33	05 10	04 42	04 29	04 13	03 54	03 31	03 02
21	08 17	07 54	07 30	07 02	06 44	06 25	06 01	05 30	05 15	04 57	04 36	04 09	03 30
22	09 16	08 54	08 30	08 03	07 46	07 27	07 05	06 34	06 20	06 02	05 42	05 16	04 40
23	10 15	09 55	09 34	09 09	08 54	08 38	08 17	07 52	07 39	07 24	07 08	06 48	06 22
24	11 10	10 54	10 37	10 17	10 05	09 52	09 36	09 16	09 06	08 55	08 43	08 29	08 12
25	12 03	11 51	11 39	11 24	11 16	11 06	10 55	10 41	10 35	10 28	10 20	10 11	10 00
26	12 53	12 46	12 39	12 31	12 26	12 20	12 14	12 06	12 03	11 59	11 54	11 50	11 44
27	13 41	13 40	13 38	13 36	13 34	13 33	13 32	13 30	13 29	13 28	13 27	13 26	13 25
28	14 29	14 33	14 37	14 41	14 43	14 46	14 50	14 54	14 56	14 58	15 00	15 03	15 06
29	15 19	15 27	15 37	15 47	15 54	16 00	16 09	16 19	16 24	16 29	16 35	16 41	16 49
30	16 11	16 24	16 39	16 55	17 05	17 16	17 30	17 46	17 54	18 02	18 12	18 23	18 36
31	17 06	17 23	17 42	18 05	18 18	18 33	18 51	19 14	19 25	19 37	19 51	20 08	20 28
June 1	18 03	18 24	18 47	19 14	19 29	19 47	20 09	20 37	20 51	21 07	21 26	21 50	22 21
2	19 03	19 25	19 50	20 18	20 35	20 55	21 19	21 50	22 05	22 23	22 46	23 14	23 55
3	20 02	20 24	20 48	21 16	21 33	21 53	22 16	22 46	23 01	23 19	23 40	..	..
4	20 58	21 18	21 41	22 07	22 22	22 39	23 00	23 27	23 40	23 54	..	00 06	00 44
5	21 49	22 07	22 27	22 49	23 01	23 16	23 34	23 55	..	..	00 12	00 32	00 58
6	22 37	22 51	23 07	23 24	23 34	23 46	23 59	..	00 06	00 17	00 30	00 46	01 03
7	23 20	23 31	23 42	23 55	..	..	..	00 16	00 24	00 32	00 42	00 52	01 05
8	..	..	..	..	00 02	00 10	00 20	00 32	00 40	00 47	00 53	00 59	01 05
9	00 01	00 08	00 15	00 22	00 27	00 32	00 38	00 44	00 51	00 55	00 59	01 01	01 04
10	00 40	00 43	00 45	00 48	00 49	00 51	00 53	00 56	00 57	00 58	00 59	01 01	01 02
11	01 19	01 17	01 15	01 13	01 12	01 10	01 09	01 07	01 06	01 05	01 04	01 02	01 01
12	01 59	01 53	01 46	01 39	01 35	01 30	01 25	01 18	01 15	01 12	01 08	01 04	01 00
13	02 41	02 31	02 20	02 07	02 00	01 52	01 43	01 32	01 26	01 21	01 14	01 07	00 59
14	03 26	03 11	02 56	02 39	02 29	02 18	02 04	01 48	01 40	01 32	01 22	01 12	01 00
15	04 15	03 57	03 38	03 16	03 03	02 48	02 31	02 10	01 59	01 48	01 35	01 20	01 02
16	05 09	04 48	04 26	04 00	03 45	03 27	03 06	02 40	02 27	02 12	01 55	01 35	01 09
17	06 07	05 45	05 20	04 52	04 36	04 16	03 53	03 23	03 08	02 51	02 30	02 05	01 29
18	07 07	06 45	06 21	05 53	05 36	05 16	04 53	04 23	04 08	03 50	03 29	03 02	02 24
19	08 08	07 47	07 25	06 59	06 44	06 26	06 05	05 38	05 24	05 09	04 51	04 29	04 00
20	09 05	08 48	08 30	08 08	07 55	07 41	07 23	07 02	06 52	06 40	06 26	06 11	05 52
21	09 59	09 46	09 33	09 17	09 07	08 57	08 44	08 29	08 22	08 13	08 04	07 54	07 42
22	10 50	10 42	10 34	10 24	10 18	10 11	10 04	09 54	09 50	09 45	09 40	09 34	09 28
23	11 39	11 36	11 33	11 29	11 27	11 24	11 22	11 18	11 17	11 15	11 13	11 11	11 09
24	12 26	12 28	12 31	12 33	12 35	12 36	12 38	12 41	12 42	12 43	12 44	12 46	12 48
25	13 14	13 21	13 29	13 38	13 43	13 48	13 56	14 04	14 08	14 12	14 16	14 22	14 28
26	14 04	14 16	14 29	14 44	14 52	15 02	15 14	15 28	15 35	15 42	15 51	16 00	16 11
27	14 56	15 13	15 30	15 51	16 03	16 16	16 33	16 54	17 03	17 14	17 27	17 41	17 59
28	15 52	16 16	16 33	16 58	17 13	17 30	17 51	18 18	18 30	18 44	19 02	19 22	19 49
29	16 50	17 12	17 36	18 04	18 21	18 40	19 03	19 33	19 48	20 06	20 27	20 54	21 31
30	17 49	18 12	18 36	19 04	19 21	19 41	20 05	20 36	20 51	21 09	21 31	21 59	22 39
July 1	18 46	19 08	19 31	19 58	20 14	20 32	20 54	21 23	21 36	21 52	22 11	22 34	23 04
2	19 40	19 59	20 20	20 43	20 57	21 13	21 32	21 55	22 06	22 19	22 34	22 51	23 12
3	20 29	20 45	21 02	21 21	21 32	21 45	22 00	22 19	22 27	22 37	22 48	23 00	23 14

MOONSET, 1931.

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LOCAL MEAN TIME OF MOONSET (MOON'S UPPER LIMB),
MERIDIAN OF GREENWICH, 1931.

To obtain standard time see directions under Sunrise and Sunset.
For other longitudes and for southern latitudes see page 676.

Lat.		0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
Date.														
May	17	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
	18	17 57	18 15	18 34	18 56	19 09	19 24	19 42	20 05	20 16	20 28	20 42	20 58	21 18
	19	18 50	19 11	19 33	19 59	20 15	20 32	20 54	21 22	21 35	21 50	22 09	22 31	23 01
	20	19 47	20 09	20 34	21 02	21 18	21 38	22 02	22 32	22 47	23 05	23 26	23 54	..
	21	20 46	21 08	21 33	22 01	22 17	22 37	23 00	23 31	23 46	..	..	..	00 32
	22	21 45	22 06	22 28	22 54	23 09	23 27	23 48	..	..	00 03	00 24	00 50	01 26
	23	22 42	23 00	23 19	23 40	23 53	..	..	00 15	00 28	00 42	01 00	01 20	01 45
	24	23 36	23 50	..	..	..	00 08	00 25	00 46	00 56	01 08	01 21	01 35	01 53
	25	..	..	00 04	00 21	00 30	00 42	00 54	01 10	01 17	01 25	01 34	01 44	01 55
	26	00 27	00 36	00 46	00 57	01 03	01 10	01 18	01 28	01 32	01 38	01 43	01 49	01 56
	27	01 16	01 20	01 24	01 29	01 32	01 35	01 39	01 43	01 45	01 47	01 50	01 52	01 55
	28	02 04	02 03	02 02	02 01	02 00	01 59	01 58	01 57	01 57	01 56	01 56	01 55	01 54
	29	02 52	02 46	02 40	02 33	02 28	02 24	02 18	02 12	02 09	02 06	02 02	01 58	01 54
	30	03 43	03 32	03 20	03 07	02 59	02 50	02 40	02 28	02 23	02 16	02 09	02 02	01 53
	31	04 36	04 21	04 04	03 45	03 34	03 21	03 07	02 48	02 40	02 31	02 20	02 08	01 54
June	1	05 33	05 13	04 52	04 29	04 15	03 58	03 39	03 15	03 04	02 51	02 36	02 19	01 58
	2	06 32	06 10	05 46	05 19	05 03	04 44	04 21	03 53	03 39	03 22	03 03	02 39	02 07
	3	07 31	07 08	06 44	06 15	05 58	05 39	05 14	04 44	04 28	04 10	03 48	03 20	02 38
	4	08 29	08 07	07 44	07 16	06 57	06 41	06 17	05 48	05 33	05 16	04 55	04 29	03 53
	5	09 23	09 03	08 42	08 18	07 53	07 46	07 26	06 51	06 48	06 34	06 17	05 57	05 31
	6	10 13	09 56	09 39	09 19	08 53	08 36	08 16	07 48	07 36	07 23	07 07	06 43	06 11
	7	10 58	10 46	10 32	10 17	09 58	09 45	09 30	09 15	09 09	08 55	08 40	08 26	08 12
	8	11 40	11 32	11 23	11 12	11 06	10 59	10 51	10 41	10 37	10 32	10 26	10 20	10 12
	9	12 20	12 16	12 12	12 06	12 03	11 59	11 55	11 50	11 48	11 45	11 42	11 39	11 36
	10	12 59	12 59	12 59	12 59	12 59	12 58	12 58	12 58	12 58	12 58	12 58	12 57	12 57
	11	13 38	13 43	13 47	13 52	13 55	13 58	14 02	14 06	14 08	14 11	14 13	14 16	14 19
	12	14 19	14 27	14 36	14 46	14 52	14 59	15 07	15 16	15 21	15 26	15 31	15 37	15 44
	13	15 02	15 15	15 28	15 43	15 52	16 03	16 15	16 29	16 36	16 44	16 53	17 02	17 14
	14	15 49	16 06	16 23	16 43	16 55	17 09	17 25	17 46	17 55	18 06	18 18	18 33	18 50
	15	16 41	17 00	17 22	17 46	18 00	18 17	18 38	19 03	19 16	19 30	19 46	20 07	20 32
	16	17 37	17 59	18 22	18 50	19 06	19 25	19 48	20 18	20 32	20 49	21 10	21 36	22 11
	17	18 36	18 59	19 23	19 52	20 08	20 28	20 52	21 22	21 37	21 55	22 16	22 44	23 22
	18	19 36	19 58	20 21	20 48	21 04	21 22	21 44	22 12	22 26	22 42	23 00	23 22	23 51
	19	20 36	20 54	21 15	21 38	21 52	22 07	22 25	22 48	22 59	23 12	23 26	23 42	..
	20	21 32	21 47	22 02	22 21	22 32	22 43	22 58	23 14	23 22	23 31	23 41	23 52	00 01
	21	22 24	22 35	22 46	22 58	23 05	23 13	23 23	23 34	23 39	23 45	23 51	23 58	00 05
	22	23 14	23 19	23 25	23 32	23 35	23 40	23 44	23 50	23 53	23 56	23 59	..	00 06
	23	..	..	..	..	..	..	..	..	..	..	..	..	00 06
	24	00 02	00 02	00 03	00 03	00 03	00 04	00 04	00 04	00 05	00 05	00 05	00 05	00 06
	25	00 49	00 44	00 40	00 34	00 31	00 28	00 23	00 18	00 16	00 13	00 11	00 08	00 04
	26	01 38	01 28	01 18	01 07	01 00	00 53	00 44	00 34	00 29	00 24	00 18	00 11	00 04
	27	02 29	02 14	02 00	01 42	01 32	01 21	01 08	00 52	00 45	00 36	00 27	00 16	00 05
	28	03 23	03 05	02 45	02 23	02 10	01 55	01 38	01 16	01 05	00 54	00 40	00 25	00 07
	29	04 20	03 58	03 36	03 10	02 54	02 36	02 15	01 48	01 35	01 20	01 02	00 41	00 14
	30	05 18	04 56	04 31	04 03	03 46	03 27	03 03	02 32	02 17	02 00	01 38	01 12	00 34
July	1	06 17	05 54	05 30	05 02	04 45	04 26	04 02	03 31	03 16	02 58	02 37	02 09	01 30
	2	07 12	06 52	06 29	06 04	05 48	05 30	05 09	04 41	04 28	04 12	03 54	03 31	03 02
	3	08 04	07 46	07 27	07 05	06 52	06 37	06 19	05 57	05 46	05 34	05 19	05 03	04 43

MOONRISE, 1931.

LOCAL MEAN TIME OF MOONRISE (MOON'S UPPER LIMB),
MERIDIAN OF GREENWICH, 1931.

To obtain standard time see directions under Sunrise and Sunset.

For other longitudes and for southern latitudes see page 676.

Lat.		0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
Date.														
July	1	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
	2	19 40	19 59	20 20	20 43	20 57	21 13	21 32	21 55	22 06	22 19	22 34	22 51	23 12
	3	21 14	21 26	21 39	21 54	22 02	22 12	22 23	22 36	22 42	22 49	22 57	23 05	23 15
	4	21 57	22 04	22 13	22 23	22 28	22 34	22 41	22 50	22 54	22 58	23 03	23 08	23 14
	5	22 37	22 40	22 44	22 49	22 52	22 55	22 58	23 02	23 04	23 06	23 08	23 11	23 13
	6	23 15	23 15	23 15	23 14	23 14	23 14	23 13	23 13	23 13	23 12	23 12	23 12	23 12
	7	23 54	23 50	23 45	23 40	23 36	23 33	23 29	23 24	23 22	23 20	23 17	23 14	23 10
	8	..	..	..	..	..	23 54	23 46	23 36	23 32	23 27	23 22	23 16	23 10
	9	00 35	00 26	00 17	00 06	00 00	..	..	23 51	23 44	23 37	23 29	23 20	23 10
	10	01 18	01 05	00 52	00 36	00 27	00 17	00 05	..	..	23 51	23 39	23 26	23 11
	11	02 05	01 48	01 30	01 10	00 58	00 45	00 29	00 10	00 01	..	23 56	23 38	23 16
	12	02 56	02 36	02 15	01 51	01 37	01 20	01 00	00 36	00 24	00 11	..	23 59	23 28
	13	03 53	03 31	03 07	02 40	02 23	02 05	01 42	01 13	00 59	00 43	00 23	..	..
	14	04 53	04 30	04 06	03 37	03 20	03 00	02 37	02 06	01 51	01 33	01 11	00 44	00 05
	15	05 54	05 32	05 09	04 42	04 26	04 08	03 45	03 16	03 02	02 45	02 26	02 01	01 29
	16	06 54	06 36	06 16	05 52	05 38	05 23	05 04	04 40	04 28	04 15	04 00	03 41	03 19
	17	07 52	07 37	07 20	07 03	06 53	06 41	06 26	06 09	06 00	05 51	05 40	05 28	05 14
	18	08 45	08 35	08 25	08 13	08 06	07 58	07 49	07 37	07 32	07 26	07 20	07 13	07 04
	19	09 35	09 31	09 26	09 20	09 17	09 14	09 09	09 04	09 02	08 59	08 56	08 53	08 50
	20	10 24	10 25	10 25	10 26	10 27	10 27	10 28	10 28	10 29	10 29	10 30	10 30	10 31
	21	11 12	11 18	11 24	11 32	11 35	11 40	11 46	11 52	11 55	11 59	12 03	12 07	12 12
	22	12 01	12 12	12 23	12 36	12 44	12 53	13 04	13 16	13 22	13 29	13 36	13 44	13 54
	23	12 52	13 08	13 24	13 43	13 54	14 07	14 22	14 41	14 50	15 00	15 11	15 24	15 40
	24	13 46	14 05	14 26	14 50	15 04	15 20	15 40	16 04	16 16	16 30	16 46	17 05	17 28
	25	14 43	15 04	15 28	15 54	16 11	16 30	16 53	17 22	17 36	17 53	18 14	18 39	19 14
	26	15 40	16 03	16 28	16 56	17 13	17 33	17 57	18 28	18 44	19 02	19 24	19 53	20 35
	27	16 37	17 00	17 23	17 51	18 08	18 27	18 50	19 20	19 34	19 51	20 11	20 36	21 11
	28	17 32	17 52	18 14	18 39	18 54	19 10	19 31	19 56	20 08	20 22	20 39	20 58	21 22
	29	18 22	18 40	18 58	19 19	19 31	19 45	20 02	20 22	20 32	20 43	20 55	21 09	21 25
	30	19 09	19 23	19 37	19 53	20 03	20 14	20 26	20 42	20 48	20 56	21 05	21 15	21 26
Aug.	31	19 53	20 02	20 12	20 23	20 30	20 37	20 46	20 56	21 01	21 06	21 12	21 18	21 26
	1	20 33	20 38	20 44	20 50	20 54	20 58	21 03	21 09	21 11	21 14	21 17	21 21	21 24
	2	21 12	21 13	21 15	21 16	21 17	21 18	21 18	21 20	21 20	21 21	21 21	21 22	21 23
	3	21 51	21 48	21 45	21 41	21 39	21 36	21 34	21 31	21 29	21 27	21 26	21 24	21 21
	4	22 31	22 23	22 16	22 07	22 02	21 56	21 50	21 42	21 38	21 35	21 30	21 26	21 20
	5	23 12	23 01	22 49	22 35	22 27	22 18	22 08	21 55	21 50	21 45	21 36	21 28	21 20
	6	23 56	23 41	23 25	23 06	22 56	22 44	22 29	22 12	22 04	21 54	21 44	21 33	21 20
	7	..	..	..	23 43	23 30	23 15	22 56	22 34	22 23	22 11	21 57	21 41	21 22
	8	00 45	00 26	00 06	..	..	23 54	23 32	23 05	22 52	22 36	22 18	21 57	21 29
	9	01 38	01 17	00 54	00 28	00 12	..	..	23 49	23 34	23 17	22 56	22 29	21 51
	10	02 36	02 13	01 49	01 20	01 03	00 44	00 20	..	..	..	23 57	23 30	22 52
	11	03 36	03 14	02 50	02 22	02 05	01 45	01 22	00 51	00 36	00 19	..	..	..
	12	04 37	04 17	03 55	03 30	03 15	02 57	02 36	02 10	01 57	01 42	01 24	01 02	00 35
	13	05 37	05 20	05 02	04 41	04 29	04 15	03 58	03 38	03 28	03 17	03 04	02 49	02 31
	14	06 33	06 21	06 08	05 53	05 45	05 35	05 23	05 10	05 03	04 55	04 47	04 38	04 27
	15	07 26	07 19	07 12	07 04	06 59	06 54	06 47	06 40	06 36	06 32	06 28	06 23	06 17
	16	08 17	08 16	08 14	08 13	08 12	08 11	08 09	08 08	08 07	08 06	08 05	08 04	08 04
	17	09 07	09 11	09 15	09 20	09 23	09 26	09 30	09 35	09 37	09 39	09 42	09 45	09 48

MOONSET, 1931.

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LOCAL MEAN TIME OF MOONSET (MOON'S UPPER LIMB),
MERIDIAN OF GREENWICH, 1931.

To obtain standard time see directions under Sunrise and Sunset.
For other longitudes and for southern latitudes see page 676.

Lat.	Date.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
July	1	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
	2	07 12	06 52	06 29	06 04	05 48	05 30	05 09	04 41	04 28	04 12	03 54	03 31	03 02
	3	08 04	07 46	07 27	07 05	06 52	06 37	06 19	05 57	05 46	05 34	05 19	05 03	04 43
	4	08 51	08 37	08 22	08 05	07 54	07 43	07 29	07 12	07 04	06 55	06 45	06 33	06 19
	5	09 35	09 25	09 14	09 02	08 55	08 46	08 37	08 25	08 20	08 14	08 07	07 59	07 50
	6	10 16	10 10	10 04	09 57	09 52	09 48	09 42	09 35	09 32	09 29	09 25	09 21	09 16
	7	10 56	10 54	10 52	10 50	10 49	10 47	10 46	10 44	10 43	10 42	10 41	10 40	10 38
	8	11 34	11 37	11 39	11 42	11 44	11 46	11 49	11 51	11 52	11 54	11 56	11 57	11 59
	9	12 14	12 21	12 28	12 36	12 40	12 46	12 52	13 00	13 03	13 08	13 12	13 16	13 22
	10	12 55	13 06	13 18	13 31	13 39	13 48	13 58	14 11	14 17	14 24	14 31	14 39	14 48
	11	13 40	13 55	14 11	14 29	14 40	14 52	15 07	15 25	15 34	15 43	15 54	16 06	16 21
	12	14 29	14 48	15 07	15 30	15 44	15 59	16 18	16 42	16 53	17 06	17 21	17 38	18 00
	13	15 23	15 44	16 07	16 34	16 49	17 08	17 30	17 58	18 12	18 28	18 47	19 11	19 42
	14	16 21	16 44	17 08	17 37	17 54	18 13	18 37	19 08	19 23	19 41	20 02	20 30	21 09
	15	17 22	17 44	18 08	18 36	18 53	19 12	19 35	20 04	20 19	20 36	20 56	21 20	21 54
	16	18 23	18 44	19 05	19 30	19 45	20 01	20 21	20 46	20 58	21 12	21 28	21 46	22 09
	17	19 22	19 38	19 56	20 16	20 28	20 41	20 57	21 16	21 25	21 36	21 47	22 00	22 15
	18	20 17	20 29	20 42	20 57	21 05	21 14	21 25	21 38	21 45	21 52	21 59	22 07	22 17
	19	21 09	21 16	21 24	21 32	21 37	21 42	21 49	21 56	22 00	22 03	22 07	22 12	22 17
	20	21 58	22 00	22 02	22 05	22 06	22 08	22 09	22 11	22 12	22 13	22 14	22 15	22 16
	21	22 47	22 44	22 40	22 36	22 34	22 32	22 29	22 25	22 24	22 22	22 20	22 18	22 16
	22	23 35	23 27	23 18	23 08	23 03	22 57	22 49	22 40	22 36	22 32	22 27	22 21	22 15
	23	..	..	23 59	23 43	23 34	23 24	23 12	22 57	22 50	22 43	22 35	22 25	22 15
	24	00 25	00 12	..	..	..	23 55	23 39	23 19	23 09	22 58	22 46	22 32	22 16
	25	01 18	01 01	00 42	00 22	00 09	..	..	23 47	23 35	23 21	23 05	22 45	22 20
	26	02 13	01 53	01 31	01 06	00 51	00 34	00 13	..	..	23 55	23 34	23 09	22 34
	27	03 10	02 48	02 24	01 56	01 39	01 20	00 57	00 27	00 12	..	..	23 56	23 15
	28	04 08	03 45	03 21	02 52	02 35	02 16	01 52	01 20	01 05	00 47	00 25	..	..
	29	05 04	04 42	04 19	03 52	03 36	03 18	02 55	02 26	02 12	01 55	01 36	01 11	00 37
	30	05 57	05 38	05 18	04 54	04 40	04 24	04 04	03 40	03 28	03 14	02 59	02 40	02 17
	31	06 46	06 30	06 14	05 54	05 43	05 30	05 14	04 56	04 46	04 36	04 25	04 11	03 56
Aug.	1	07 31	07 19	07 07	06 52	06 44	06 35	06 23	06 10	06 03	05 56	05 48	05 39	05 29
	2	08 13	08 05	07 57	07 48	07 43	07 37	07 30	07 21	07 17	07 13	07 08	07 02	06 56
	3	08 52	08 49	08 46	08 42	08 40	08 37	08 34	08 30	08 28	08 27	08 25	08 22	08 20
	4	09 31	09 32	09 33	09 34	09 35	09 36	09 37	09 38	09 38	09 39	09 40	09 40	09 41
	5	10 10	10 15	10 21	10 28	10 31	10 35	10 40	10 46	10 49	10 52	10 55	10 59	11 03
	6	10 50	11 00	11 10	11 21	11 28	11 36	11 44	11 55	12 00	12 06	12 12	12 19	12 27
	7	11 33	11 47	12 01	12 17	12 27	12 38	12 51	13 07	13 15	13 23	13 33	13 43	13 56
	8	12 19	12 36	12 55	13 16	13 29	13 43	14 00	14 22	14 32	14 44	14 57	15 12	15 31
	9	13 10	13 30	13 52	14 17	14 32	14 50	15 11	15 37	15 50	16 05	16 23	16 44	17 11
	10	14 05	14 27	14 52	15 20	15 36	15 56	16 19	16 50	17 04	17 22	17 43	18 10	18 48
	11	15 05	15 28	15 52	16 21	16 38	16 57	17 21	17 52	18 07	18 25	18 46	19 14	19 52
	12	16 06	16 27	16 50	17 17	17 33	17 51	18 13	18 40	18 54	19 09	19 27	19 49	20 17
	13	17 06	17 24	17 44	18 07	18 20	18 35	18 53	19 15	19 26	19 38	19 51	20 06	20 24
	14	18 04	18 18	18 33	18 50	18 59	19 11	19 25	19 41	19 48	19 56	20 05	20 16	20 27
	15	18 58	19 08	19 18	19 28	19 35	19 42	19 50	20 00	20 04	20 10	20 15	20 21	20 28
	16	19 50	19 54	19 58	20 03	20 06	20 09	20 12	20 16	20 18	20 20	20 22	20 25	20 28
	17	20 40	20 39	20 38	20 36	20 35	20 34	20 33	20 31	20 30	20 30	20 29	20 28	20 27
	18	21 30	21 24	21 17	21 08	21 04	20 59	20 53	20 46	20 43	20 39	20 35	20 30	20 26

MOONRISE, 1931.

LOCAL MEAN TIME OF MOONRISE (MOON'S UPPER LIMB),
MERIDIAN OF GREENWICH, 1931.

To obtain standard time see directions under Sunrise and Sunset.
For other longitudes and for southern latitudes see page 676.

Lat.		0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
Date.														
Aug.	16	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
	17	08 17	08 16	08 14	08 13	08 12	08 11	08 09	08 08	08 07	08 06	08 06	08 05	08 04
	18	09 07	09 11	09 15	09 20	09 23	09 26	09 30	09 35	09 37	09 39	09 42	09 45	09 48
	19	10 57	10 06	10 16	10 27	10 34	10 41	10 50	11 01	11 06	11 12	11 18	11 25	11 33
	20	12 48	12 02	12 11	12 17	12 21	12 25	12 28	12 31	12 36	12 45	12 55	13 07	13 20
	21	14 42	14 00	14 20	14 42	15 06	15 31	16 00	16 33	17 04	17 41	18 24	19 13	20 08
	22	16 38	16 59	17 22	17 49	18 21	18 58	19 36	20 19	21 00	21 44	22 31	23 21	24 14
	23	18 35	18 58	19 23	19 51	20 24	21 01	21 44	22 31	23 16	24 00	24 48	25 39	26 33
	24	20 32	20 55	21 20	21 48	22 21	23 01	23 44	24 31	25 16	26 00	26 48	27 39	28 33
	25	22 27	22 50	23 15	23 43	24 16	24 55	25 34	26 19	27 00	27 44	28 31	29 21	30 14
	26	24 18	24 41	25 06	25 34	26 07	26 46	27 25	28 10	28 50	29 34	30 21	31 11	32 04
	27	26 06	26 29	26 54	27 22	27 55	28 34	29 13	30 00	30 44	31 28	32 15	33 05	34 00
	28	27 50	28 13	28 38	29 06	29 39	30 18	30 57	31 44	32 28	33 12	33 59	34 49	35 43
	29	29 31	29 54	30 19	30 47	31 20	31 59	32 38	33 25	34 09	34 52	35 40	36 31	37 26
	30	31 10	31 33	31 58	32 26	33 00	33 39	34 18	35 05	35 49	36 32	37 19	38 10	39 05
Sept.	31	20 28	20 22	20 16	20 09	20 05	20 01	19 56	19 49	19 47	19 43	19 40	19 36	19 32
	1	21 09	20 59	20 48	20 36	20 29	20 22	20 12	20 02	19 56	19 51	19 45	19 38	19 30
	2	21 52	21 38	21 23	21 06	20 56	20 46	20 32	20 16	20 09	20 01	19 52	19 42	19 30
	3	22 38	22 20	22 01	21 40	21 28	21 13	20 56	20 36	20 26	20 15	20 02	19 48	19 31
	4	23 28	23 08	22 46	22 20	22 05	21 48	21 28	21 02	20 49	20 35	20 19	19 59	19 35
	5	..	..	23 36	23 08	22 51	22 32	22 09	21 39	21 24	21 07	20 47	20 22	19 47
	6	00 22	00 00	..	..	23 47	23 27	23 03	22 32	22 16	21 58	21 36	21 07	20 25
	7	01 20	00 57	00 32	00 04	..	..	..	23 41	23 26	23 10	22 50	22 25	21 51
	8	02 20	01 58	01 35	01 08	00 51	00 33	00 10	..	..	..	..	..	23 43
	9	03 19	03 00	02 40	02 17	02 03	01 47	01 28	01 04	00 52	00 39	00 24	00 06	..
	10	04 16	04 02	03 46	03 28	03 17	03 06	02 51	02 34	02 25	02 16	02 05	01 53	01 39
	11	05 11	05 01	04 51	04 40	04 33	04 25	04 16	04 05	04 00	03 54	03 48	03 41	03 33
	12	06 03	05 59	05 55	05 50	05 47	05 44	05 40	05 36	05 33	05 31	05 29	05 26	05 22
	13	06 55	06 56	06 58	07 00	07 01	07 02	07 03	07 05	07 06	07 07	07 08	07 09	07 10
	14	07 46	07 53	08 00	08 09	08 14	08 20	08 27	08 35	08 38	08 43	08 47	08 52	08 58
	15	08 39	08 51	09 04	09 19	09 28	09 38	09 50	10 05	10 12	10 19	10 28	10 38	10 49
	16	09 34	09 50	10 08	10 29	10 42	10 56	11 13	11 34	11 44	11 56	12 09	12 24	12 43
	17	10 31	10 51	11 13	11 39	11 54	12 12	12 33	13 00	13 13	13 29	13 47	14 09	14 37
	18	11 29	11 52	12 16	12 44	13 01	13 21	13 45	14 16	14 32	14 50	15 12	15 40	16 22
	19	12 27	12 50	13 15	13 44	14 01	14 21	14 45	15 17	15 32	15 51	16 13	16 42	17 25
	20	13 23	13 44	14 08	14 36	14 52	15 10	15 33	16 01	16 15	16 31	16 50	17 14	17 45
	21	14 16	14 35	14 56	15 20	15 33	15 49	16 09	16 32	16 44	16 57	17 12	17 29	17 50
	22	15 04	15 21	15 37	15 57	16 08	16 21	16 36	16 55	17 04	17 14	17 25	17 37	17 52
	23	15 49	16 01	16 14	16 29	16 38	16 47	16 58	17 12	17 18	17 25	17 33	17 42	17 51
	24	16 31	16 39	16 47	16 57	17 03	17 09	17 16	17 25	17 29	17 34	17 39	17 44	17 50
	25	17 10	17 14	17 18	17 23	17 26	17 29	17 32	17 37	17 39	17 41	17 43	17 45	17 48
	26	17 49	17 49	17 48	17 48	17 48	17 48	17 48	17 47	17 47	17 47	17 47	17 47	17 46
	27	18 28	18 23	18 19	18 13	18 10	18 07	18 03	17 58	17 56	17 53	17 51	17 48	17 45
	28	19 08	18 59	18 50	18 40	18 34	18 27	18 19	18 10	18 06	18 01	17 56	17 50	17 43
	29	19 50	19 37	19 23	19 08	18 59	18 49	18 38	18 24	18 17	18 10	18 02	17 53	17 42
Oct.	30	20 34	20 18	20 00	19 40	19 29	19 16	19 00	18 41	18 32	18 22	18 10	17 57	17 42
	1	21 23	21 03	20 42	20 18	20 04	19 47	19 27	19 04	18 52	18 38	18 24	18 06	17 45
	2	22 15	21 53	21 29	21 02	20 46	20 27	20 05	19 36	19 22	19 06	18 47	18 24	17 53

MOONSET, 1931.

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LOCAL MEAN TIME OF MOONSET (MOON'S UPPER LIMB),
MERIDIAN OF GREENWICH, 1931.

To obtain standard time see directions under Sunrise and Sunset.
For other longitudes and for southern latitudes see page 676.

Lat.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
Date.													
Aug. 16	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
17	20 40	20 39	20 38	20 36	20 35	20 34	20 33	20 31	20 30	20 30	20 29	20 28	20 27
18	21 30	21 24	21 17	21 08	21 04	20 59	20 53	20 46	20 43	20 39	20 35	20 30	20 26
19	22 21	22 09	21 57	21 43	21 35	21 26	21 15	21 02	20 57	20 50	20 43	20 34	20 25
20	23 14	22 58	22 40	22 21	22 09	21 56	21 41	21 22	21 14	21 04	20 53	20 40	20 26
21	..	23 49	23 28	23 03	22 49	22 33	22 13	21 49	21 37	21 24	21 09	20 50	20 28
22	00 09	..	..	23 52	23 36	23 17	22 54	22 25	22 11	21 54	21 34	21 10	20 37
23	01 06	00 43	00 20	..	..	..	23 45	23 14	22 58	22 40	22 18	21 49	21 06
24	02 03	01 40	01 15	00 47	00 29	00 10	..	..	..	23 44	23 22	22 55	22 18
25	02 59	02 37	02 13	01 45	01 29	01 09	00 46	00 16	00 01	..	..	..	23 55
26	03 52	03 32	03 11	02 46	02 31	02 14	01 53	01 27	01 14	01 00	00 42	00 22	..
27	04 42	04 25	04 07	03 46	03 34	03 20	03 03	02 42	02 32	02 21	02 08	01 53	01 35
28	05 28	05 15	05 01	04 45	04 35	04 25	04 12	03 56	03 49	03 41	03 32	03 21	03 09
29	06 10	06 01	05 52	05 41	05 35	05 27	05 19	05 09	05 04	04 59	04 54	04 48	04 40
30	06 51	06 46	06 41	06 35	06 32	06 28	06 24	06 18	06 16	06 13	06 10	06 07	06 03
31	07 30	07 29	07 29	07 28	07 28	07 27	07 27	07 27	07 26	07 26	07 26	07 26	07 25
Sept. 1	08 08	08 12	08 16	08 21	08 24	08 26	08 30	08 34	08 36	08 39	08 41	08 44	08 46
2	08 48	08 56	09 04	09 14	09 20	09 26	09 34	09 43	09 47	09 52	09 57	10 03	10 10
3	09 29	09 41	09 54	10 09	10 18	10 28	10 39	10 54	11 00	11 08	11 16	11 25	11 36
4	10 14	10 30	10 46	11 06	11 18	11 31	11 47	12 06	12 16	12 26	12 38	12 52	13 08
5	11 02	11 21	11 42	12 05	12 20	12 36	12 56	13 21	13 33	13 46	14 02	14 22	14 46
6	11 54	12 16	12 39	13 06	13 22	13 41	14 04	14 33	14 48	15 04	15 24	15 50	16 24
7	12 50	13 13	13 38	14 06	14 23	14 43	15 08	15 39	15 54	16 12	16 34	17 03	17 45
8	13 49	14 11	14 35	15 03	15 20	15 39	16 02	16 32	16 46	17 04	17 24	17 49	18 23
9	14 48	15 08	15 30	15 55	16 10	16 26	16 47	17 12	17 24	17 38	17 54	18 12	18 35
10	15 46	16 03	16 21	16 41	16 52	17 06	17 22	17 41	17 50	18 00	18 11	18 24	18 39
11	16 42	16 54	17 07	17 21	17 29	17 39	17 49	18 02	18 08	18 15	18 22	18 31	18 40
12	17 36	17 42	17 50	17 57	18 02	18 07	18 13	18 20	18 23	18 27	18 31	18 35	18 40
13	18 27	18 28	18 30	18 31	18 32	18 33	18 34	18 35	18 36	18 36	18 37	18 38	18 39
14	19 18	19 14	19 10	19 05	19 02	18 59	18 55	18 50	18 48	18 46	18 44	18 41	18 38
15	20 11	20 01	19 51	19 40	19 33	19 25	19 17	19 06	19 01	18 56	18 50	18 44	18 36
16	21 04	20 50	20 35	20 17	20 07	19 55	19 42	19 25	19 18	19 09	18 59	18 49	18 36
17	22 01	21 42	21 22	20 59	20 46	20 30	20 12	19 50	19 39	19 27	19 13	18 58	18 38
18	22 59	22 37	22 14	21 47	21 31	21 13	20 51	20 23	20 09	19 53	19 35	19 12	18 43
19	23 57	23 34	23 09	22 41	22 24	22 04	21 39	21 08	20 52	20 34	20 12	19 44	19 02
20	..	..	..	23 39	23 22	23 02	22 38	22 07	21 51	21 33	21 11	20 43	20 00
21	00 54	00 32	00 07	..	..	..	23 44	23 17	23 03	22 47	22 28	22 05	21 35
22	01 49	01 28	01 06	00 40	00 24	00 06	..	..	..	..	23 53	23 36	23 16
23	02 40	02 22	02 02	01 40	01 26	01 12	00 54	00 31	00 20	00 07	..	..	..
24	03 26	03 12	02 57	02 39	02 28	02 17	02 03	01 45	01 37	01 28	01 18	01 06	00 52
25	04 09	03 59	03 48	03 36	03 28	03 20	03 10	02 58	02 52	02 46	02 39	02 31	02 22
26	04 50	04 44	04 38	04 30	04 26	04 21	04 15	04 08	04 05	04 01	03 57	03 53	03 48
27	05 29	05 27	05 25	05 23	05 22	05 20	05 18	05 16	05 15	05 14	05 13	05 12	05 10
28	06 08	06 10	06 13	06 16	06 18	06 19	06 22	06 24	06 26	06 27	06 28	06 30	06 32
29	06 47	06 54	07 01	07 09	07 14	07 19	07 25	07 33	07 36	07 40	07 44	07 49	07 54
30	07 28	07 39	07 50	08 03	08 11	08 20	08 30	08 43	08 49	08 55	09 02	09 10	09 20
Oct. 1	08 11	08 26	08 42	09 00	09 10	09 22	09 37	09 55	10 03	10 13	10 23	10 36	10 50
2	08 57	09 16	09 35	09 58	10 11	10 27	10 45	11 08	11 19	11 32	11 46	12 03	12 24
3	09 48	10 08	10 31	10 57	11 13	11 31	11 53	12 21	12 35	12 50	13 10	13 33	14 03

MOONRISE, 1931.

LOCAL MEAN TIME OF MOONRISE (MOON'S UPPER LIMB),
MERIDIAN OF GREENWICH, 1931.

To obtain standard time see directions under Sunrise and Sunset.
For other longitudes and for southern latitudes see page 676.

Lat.		0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
Date.														
Oct.	1	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
	2	21 23	21 03	20 42	20 18	20 04	19 47	19 27	19 04	18 52	18 39	18 24	18 06	17 45
	3	22 15	21 53	21 29	21 02	20 46	20 27	20 05	19 36	19 22	19 06	18 47	18 24	17 53
	4	23 10	22 47	22 22	21 54	21 37	21 17	20 53	20 22	20 06	19 48	19 26	18 58	18 17
	5	..	23 45	23 21	22 53	22 36	22 17	21 53	21 23	21 08	20 50	20 28	20 01	19 23
	6	00 08	..	..	23 58	23 43	23 25	23 04	22 38	22 25	22 10	21 52	21 31	21 04
	7	01 05	00 45	00 23	..	..	..	..	..	23 52	23 41	23 28	23 14	22 56
	8	02 01	01 44	01 26	01 06	00 54	00 40	00 23	00 02	..	..	..	..	..
	9	02 55	02 43	02 30	02 15	02 07	01 56	01 45	01 31	01 24	01 16	01 08	00 58	00 48
	10	03 47	03 40	03 33	03 25	03 20	03 14	03 08	03 00	02 56	02 52	02 48	02 43	02 37
	11	04 39	04 37	04 36	04 34	04 33	04 32	04 30	04 29	04 28	04 27	04 26	04 25	04 24
	12	05 30	05 34	05 38	05 44	05 46	05 50	05 54	05 58	06 01	06 03	06 06	06 09	06 12
	13	06 23	06 33	06 43	06 55	07 01	07 09	07 18	07 30	07 35	07 41	07 48	07 55	08 03
	14	07 18	07 33	07 48	08 07	08 18	08 30	08 44	09 02	09 11	09 21	09 32	09 44	09 58
	15	08 16	08 35	08 56	09 19	09 33	09 50	10 09	10 34	10 46	10 59	11 15	11 34	11 58
	16	09 16	09 39	10 02	10 29	10 46	11 05	11 28	11 58	12 12	12 30	12 50	13 16	13 53
	17	10 17	10 40	11 05	11 34	11 51	12 12	12 36	13 07	13 23	13 42	14 05	14 35	15 20
	18	11 16	11 38	12 02	12 30	12 47	13 06	13 29	13 59	14 14	14 31	14 52	15 18	15 53
	19	12 10	12 31	12 53	13 18	13 32	13 50	14 10	14 36	14 48	15 02	15 18	15 37	16 02
	20	13 01	13 18	13 36	13 58	14 10	14 24	14 40	15 01	15 10	15 21	15 33	15 47	16 04
	21	13 47	14 00	14 15	14 31	14 42	14 51	15 04	15 19	15 26	15 34	15 43	15 53	16 04
	22	14 30	14 39	14 49	15 01	15 07	15 15	15 23	15 34	15 38	15 43	15 49	15 56	16 03
	23	15 10	15 15	15 21	15 27	15 31	15 35	15 40	15 46	15 48	15 51	15 54	15 58	16 01
	24	15 49	15 50	15 51	15 52	15 53	15 55	15 56	15 57	15 57	15 57	15 58	15 59	16 00
	25	16 28	16 24	16 21	16 17	16 15	16 13	16 10	16 07	16 05	16 04	16 02	16 00	15 58
	26	17 07	17 00	16 52	16 43	16 38	16 33	16 26	16 18	16 15	16 11	16 06	16 02	15 56
	27	17 48	17 37	17 25	17 11	17 03	16 54	16 44	16 31	16 26	16 19	16 12	16 04	15 55
	28	18 32	18 17	18 01	17 43	17 32	17 20	17 05	16 48	16 39	16 30	16 20	16 09	15 55
	29	19 20	19 01	18 41	18 18	18 05	17 50	17 31	17 09	16 58	16 46	16 32	16 16	15 57
	30	20 11	19 50	19 27	19 00	18 45	18 27	18 05	17 38	17 25	17 10	16 52	16 30	16 03
	31	21 05	20 42	20 18	19 49	19 33	19 13	18 50	18 19	18 04	17 46	17 25	16 58	16 21
Nov.	1	22 01	21 38	21 14	20 46	20 29	20 09	19 45	19 14	18 59	18 41	18 20	17 52	17 11
	2	22 58	22 36	22 14	21 48	21 32	21 14	20 52	20 24	20 10	19 54	19 35	19 12	18 42
	3	23 52	23 35	23 15	22 53	22 40	22 24	22 06	21 43	21 32	21 20	21 06	20 48	20 28
	4	..	..	..	23 59	23 49	23 38	23 24	23 07	22 59	22 51	22 41	22 29	22 16
	5	00 45	00 31	00 16	..	..	..	..	..	..	..	..	..	..
	6	01 36	01 27	01 17	01 06	01 00	00 52	00 43	00 33	00 28	00 22	00 16	00 09	00 02
	7	02 26	02 22	02 18	02 13	02 10	02 06	02 03	01 58	01 56	01 54	01 51	01 48	01 45
	8	03 16	03 17	03 18	03 20	03 21	03 22	03 23	03 24	03 25	03 26	03 27	03 28	03 29
	9	04 06	04 13	04 20	04 29	04 34	04 39	04 45	04 53	04 57	05 01	05 05	05 10	05 16
	10	05 00	05 12	05 25	05 40	05 48	05 58	06 10	06 24	06 31	06 38	06 47	06 56	07 07
	11	05 57	06 13	06 32	06 52	07 05	07 19	07 36	07 57	08 07	08 19	08 32	08 47	09 05
	12	06 57	07 18	07 40	08 05	08 21	08 38	09 00	09 27	09 41	09 56	10 14	10 37	11 06
	13	07 59	08 28	08 46	09 15	09 32	09 52	10 16	10 47	11 02	11 20	11 43	12 12	12 53
	14	09 01	09 24	09 48	10 17	10 34	10 54	11 18	11 49	12 04	12 22	12 44	13 12	13 52
	15	10 00	10 21	10 44	11 10	11 26	11 44	12 06	12 33	12 46	13 01	13 19	13 41	14 09
	16	10 53	11 12	11 31	11 54	12 07	12 22	12 41	13 03	13 13	13 25	13 39	13 55	14 14
	17	11 42	11 57	12 13	12 31	12 41	12 53	13 07	13 24	13 32	13 41	13 51	14 02	14 15
	18	12 26	12 37	12 49	13 02	13 10	13 18	13 28	13 40	13 46	13 52	14 01	14 06	14 14

MOONSET, 1931.

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LOCAL MEAN TIME OF MOONSET (MOON'S UPPER LIMB),
MERIDIAN OF GREENWICH, 1931.

To obtain standard time see directions under Sunrise and Sunset.
For other longitudes and for southern latitudes see page 676.

Lat.		0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
Date.														
Oct.	1	08 57	09 16	09 35	09 58	10 11	10 27	10 45	11 08	11 19	11 32	11 46	12 03	12 24
	2	09 48	10 08	10 31	10 57	11 13	11 31	11 53	12 21	12 35	12 50	13 10	13 33	14 03
	3	10 41	11 04	11 28	11 57	12 14	12 33	12 57	13 28	13 44	14 02	14 24	14 52	15 33
	4	11 38	12 01	12 25	12 54	13 11	13 30	13 54	14 25	14 40	14 58	15 20	15 47	16 26
	5	12 35	12 56	13 20	13 46	14 02	14 20	14 41	15 09	15 22	15 37	15 55	16 17	16 44
	6	13 32	13 50	14 10	14 33	14 46	15 01	15 19	15 41	15 51	16 03	16 16	16 32	16 50
	7	14 27	14 41	14 57	15 14	15 24	15 35	15 48	16 04	16 12	16 20	16 30	16 40	16 52
	8	15 20	15 30	15 40	15 51	15 58	16 05	16 13	16 24	16 28	16 33	16 39	16 45	16 52
	9	16 12	16 16	16 20	16 25	16 28	16 31	16 35	16 39	16 41	16 43	16 46	16 48	16 51
	10	17 03	17 01	17 00	16 58	16 58	16 57	16 55	16 54	16 53	16 53	16 52	16 51	16 50
	11	17 55	17 48	17 41	17 32	17 28	17 23	17 16	17 09	17 06	17 02	16 58	16 54	16 49
	12	18 49	18 36	18 24	18 09	18 01	17 51	17 40	17 27	17 21	17 14	17 06	16 58	16 48
	13	19 46	19 29	19 11	18 50	18 38	18 25	18 09	17 49	17 40	17 29	17 18	17 04	16 49
	14	20 45	20 24	20 02	19 37	19 22	19 05	18 44	18 19	18 06	17 52	17 36	17 16	16 52
	15	21 46	21 23	20 58	20 30	20 13	19 54	19 30	19 00	18 45	18 28	18 07	17 40	17 03
	16	22 46	22 22	21 58	21 29	21 12	20 52	20 27	19 56	19 40	19 21	18 58	18 29	17 44
	17	23 42	23 21	22 58	22 30	22 14	21 55	21 33	21 03	20 49	20 32	20 12	19 47	19 12
	18	..	..	23 56	23 32	23 18	23 02	22 42	22 18	22 06	21 52	21 37	21 18	20 54
	19	00 35	00 16	..	..	..	..	23 52	23 34	23 24	23 14	23 03	22 49	22 34
	20	01 24	01 08	00 52	00 32	00 21	00 08	..	..	..	..	..	..	..
	21	02 08	01 57	01 44	01 30	01 22	01 12	01 01	00 47	00 40	00 34	00 26	00 16	00 06
	22	02 49	02 42	02 34	02 25	02 20	02 13	02 06	01 58	01 54	01 50	01 44	01 39	01 33
	23	03 29	03 26	03 22	03 18	03 16	03 13	03 10	03 06	03 05	03 03	03 01	02 59	02 56
	24	04 08	04 08	04 10	04 11	04 12	04 12	04 13	04 14	04 15	04 15	04 16	04 17	04 18
	25	04 46	04 52	04 57	05 04	05 07	05 12	05 16	05 22	05 25	05 28	05 32	05 35	05 39
	26	05 27	05 36	05 46	05 58	06 04	06 12	06 21	06 32	06 37	06 43	06 49	06 56	07 04
	27	06 09	06 23	06 37	06 54	07 04	07 15	07 28	07 44	07 51	08 00	08 09	08 20	08 33
	28	06 55	07 12	07 30	07 52	08 04	08 19	08 36	08 57	09 08	09 19	09 32	09 48	10 07
	29	07 44	08 04	08 26	08 51	09 06	09 24	09 44	10 11	10 24	10 39	10 56	11 17	11 44
	30	08 37	08 59	09 23	09 51	10 08	10 27	10 50	11 20	11 35	11 53	12 14	12 40	13 18
Nov.	31	09 32	09 55	10 20	10 48	11 05	11 25	11 49	12 20	12 36	12 54	13 16	13 44	14 25
	1	10 28	10 50	11 14	11 41	11 58	12 16	12 39	13 08	13 21	13 38	13 57	14 20	14 51
	2	11 24	11 44	12 05	12 29	12 43	12 59	13 18	13 42	13 54	14 07	14 21	14 39	15 00
	3	12 18	12 34	12 51	13 10	13 22	13 34	13 49	14 08	14 16	14 26	14 37	14 48	15 03
	4	13 10	13 21	13 34	13 48	13 55	14 04	14 15	14 27	14 33	14 40	14 47	14 55	15 04
	5	14 00	14 06	14 14	14 21	14 26	14 31	14 37	14 44	14 47	14 50	14 54	14 58	15 03
	6	14 49	14 51	14 52	14 54	14 55	14 56	14 57	14 58	14 59	15 00	15 00	15 01	15 02
	7	15 39	15 35	15 31	15 26	15 24	15 20	15 17	15 13	15 11	15 09	15 06	15 04	15 01
	8	16 31	16 22	16 12	16 01	15 55	15 47	15 39	15 29	15 24	15 19	15 13	15 07	15 00
	9	17 26	17 12	16 57	16 39	16 29	16 18	16 04	15 48	15 41	15 32	15 23	15 12	15 00
	10	18 25	18 06	17 46	17 24	17 10	16 55	16 36	16 14	16 03	15 51	15 37	15 21	15 02
	11	19 27	19 05	18 42	18 15	17 59	17 40	17 18	16 50	16 36	16 20	16 02	15 39	15 09
	12	20 29	20 06	19 41	19 12	18 55	18 36	18 11	17 40	17 24	17 06	16 44	16 15	15 33
	13	21 30	21 07	20 43	20 15	19 58	19 39	19 15	18 45	18 30	18 12	17 50	17 23	16 44
	14	22 26	22 06	21 44	21 19	21 04	20 47	20 26	20 00	19 47	19 32	19 14	18 53	18 26
	15	23 17	23 01	22 42	22 21	22 09	21 55	21 38	21 17	21 07	20 55	20 42	20 27	20 09
	16	..	23 51	23 37	23 21	23 12	23 01	22 48	22 33	22 26	22 17	22 08	21 58	21 46
	17	00 04	..	..	..	..	..	23 56	23 45	23 40	23 35	23 29	23 23	23 15

MOONRISE, 1931.

LOCAL MEAN TIME OF MOONRISE (MOON'S UPPER LIMB),
MERIDIAN OF GREENWICH, 1931.

To obtain standard time see directions under Sunrise and Sunset.
For other longitudes and for southern latitudes see page 676.

Lat.		0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
Date.														
Nov.	16	11 42	11 57	12 13	12 31	12 41	12 53	13 07	13 24	13 32	13 41	13 51	14 02	14 15
	17	12 26	12 37	12 49	13 02	13 10	13 18	13 28	13 40	13 46	13 52	13 58	14 06	14 14
	18	13 08	13 14	13 22	13 30	13 34	13 40	13 46	13 53	13 56	14 00	14 03	14 08	14 13
	19	13 47	13 50	13 52	13 55	13 57	13 59	14 01	14 04	14 05	14 07	14 08	14 10	14 12
	20	14 26	14 24	14 22	14 21	14 19	14 18	14 17	14 15	14 14	14 13	14 12	14 11	14 10
	21	15 05	14 59	14 53	14 46	14 42	14 38	14 32	14 26	14 23	14 20	14 17	14 13	14 09
	22	15 46	15 36	15 25	15 13	15 06	14 58	14 49	14 39	14 34	14 28	14 22	14 15	14 08
	23	16 29	16 15	16 00	15 43	15 33	15 22	15 10	14 54	14 46	14 38	14 29	14 19	14 08
	24	17 16	16 58	16 39	16 18	16 05	15 51	15 34	15 14	15 04	14 53	14 40	14 26	14 09
	25	18 06	17 46	17 24	16 58	16 44	16 26	16 06	15 40	15 28	15 14	14 57	14 38	14 14
	26	19 00	18 38	18 14	17 46	17 30	17 10	16 47	16 18	16 03	15 46	15 26	15 02	14 28
	27	19 56	19 34	19 09	18 41	18 24	18 04	17 40	17 10	16 54	16 36	16 14	15 47	15 06
	28	20 53	20 32	20 08	19 41	19 25	19 07	18 44	18 16	18 01	17 45	17 25	17 01	16 28
	29	21 48	21 30	21 09	20 46	20 32	20 16	19 57	19 32	19 21	19 07	18 52	18 34	18 11
	30	22 42	22 26	22 10	21 52	21 40	21 28	21 13	20 55	20 46	20 36	20 25	20 12	19 57
Dec.	1	23 32	23 21	23 10	22 57	22 49	22 40	22 30	22 18	22 12	22 06	21 58	21 50	21 41
	2	..	..	..	..	23 57	23 52	23 47	23 41	23 38	23 34	23 31	23 26	23 22
	3	00 20	00 14	00 08	00 01	..	..	..	..	..	..	..	..	..
	4	01 08	01 08	01 07	01 06	01 05	01 05	01 04	01 03	01 03	01 03	01 02	01 02	01 01
	5	01 56	02 01	02 06	02 11	02 14	02 18	02 22	02 28	02 30	02 32	02 35	02 39	02 42
	6	02 47	02 56	03 06	03 18	03 25	03 33	03 43	03 54	03 59	04 05	04 12	04 19	04 27
	7	03 40	03 55	04 10	04 28	04 39	04 51	05 06	05 24	05 32	05 41	05 52	06 04	06 19
	8	04 38	04 57	05 17	05 40	05 54	06 10	06 30	06 54	07 06	07 19	07 35	07 53	08 16
	9	05 39	06 01	06 24	06 51	07 08	07 27	07 50	08 19	08 34	08 51	09 11	09 36	10 11
	10	06 42	07 04	07 29	07 58	08 15	08 35	08 59	09 30	09 46	10 04	10 27	10 55	11 38
	11	07 43	08 05	08 29	08 56	09 13	09 32	09 54	10 24	10 38	10 55	11 14	11 39	12 12
	12	08 40	08 59	09 21	09 45	10 00	10 16	10 36	11 00	11 12	11 25	11 41	11 59	12 22
	13	09 32	09 49	10 06	10 26	10 38	10 51	11 07	11 26	11 35	11 45	11 56	12 09	12 24
	14	10 20	10 32	10 45	11 00	11 09	11 19	11 30	11 44	11 51	11 58	12 05	12 14	12 25
	15	11 03	11 11	11 20	11 30	11 36	11 42	11 50	11 59	12 03	12 07	12 12	12 18	12 24
	16	11 44	11 48	11 52	11 57	11 59	12 03	12 06	12 10	12 13	12 15	12 17	12 20	12 23
	17	12 22	12 22	12 22	12 22	12 22	12 22	12 22	12 21	12 21	12 21	12 21	12 21	12 21
	18	13 01	12 57	12 52	12 47	12 44	12 41	12 37	12 33	12 30	12 28	12 26	12 23	12 20
	19	13 41	13 33	13 24	13 14	13 08	13 01	12 54	12 44	12 40	12 36	12 31	12 25	12 18
	20	14 23	14 11	13 58	13 42	13 34	13 24	13 12	12 59	12 52	12 45	12 37	12 28	12 18
	21	15 08	14 52	14 35	14 15	14 04	13 51	13 35	13 16	13 07	12 58	12 46	12 34	12 19
	22	15 58	15 38	15 17	14 53	14 40	14 23	14 04	13 40	13 29	13 16	13 01	12 44	12 22
	23	16 51	16 29	16 06	15 39	15 23	15 04	14 42	14 14	14 00	13 44	13 25	13 02	12 32
	24	17 47	17 25	17 00	16 32	16 15	15 55	15 32	15 01	14 46	14 28	14 07	13 39	13 01
	25	18 45	18 23	18 00	17 32	17 15	16 56	16 33	16 04	15 49	15 32	15 11	14 45	14 09
	26	19 42	19 23	19 02	18 37	18 22	18 05	17 45	17 19	17 07	16 52	16 35	16 15	15 50
	27	20 37	20 21	20 04	19 44	19 32	19 18	19 02	18 42	18 32	18 21	18 09	17 55	17 38
	28	21 29	21 17	21 05	20 50	20 42	20 32	20 20	20 06	20 00	19 52	19 44	19 35	19 24
	29	22 18	22 11	22 04	21 55	21 50	21 44	21 38	21 30	21 26	21 22	21 17	21 12	21 06
	30	23 06	23 04	23 01	22 59	22 58	22 56	22 54	22 52	22 51	22 50	22 48	22 47	22 45
	31	23 53	23 56	23 59
	32	00 03	00 05	00 08	00 10	00 14	00 16	00 17	00 19	00 21	00 24

MOONSET, 1931.

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LOCAL MEAN TIME OF MOONSET (MOON'S UPPER LIMB),
MERIDIAN OF GREENWICH, 1931.

To obtain standard time see directions under Sunrise and Sunset.
For other longitudes and for southern latitudes see page 676.

Lat.														
Date.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°	
Nov. 16	h m ..	h m 23 51	h m 23 37	h m 23 21	h m 23 12	h m 23 01	h m 22 48	h m 22 33	h m 22 26	h m 22 17	h m 22 08	h m 21 58	h m 21 46	
17	00 04	..	..	..	..	..	23 56	23 45	23 40	23 35	23 29	23 23	23 15
18	00 47	00 38	00 29	00 18	00 11	00 04	..	..	..	..	..	..	..
19	01 27	01 23	01 18	01 12	01 08	01 05	01 00	00 55	00 52	00 50	00 47	00 43	00 40	
20	02 06	02 06	02 05	02 05	02 04	02 04	02 03	02 03	02 03	02 02	02 02	02 02	02 01	
21	02 45	02 48	02 52	02 57	03 00	03 03	03 06	03 10	03 12	03 15	03 17	03 20	03 23	
22	03 24	03 32	03 41	03 51	03 56	04 03	04 10	04 19	04 24	04 28	04 34	04 39	04 46	
23	04 06	04 18	04 31	04 46	04 55	05 05	05 16	05 30	05 37	05 44	05 53	06 02	06 13	
24	04 51	05 07	05 24	05 44	05 55	06 08	06 24	06 44	06 53	07 04	07 16	07 29	07 45	
25	05 40	05 59	06 19	06 43	06 57	07 14	07 34	07 58	08 10	08 24	08 40	08 59	09 23	
26	06 32	06 54	07 17	07 44	08 00	08 18	08 41	09 10	09 24	09 41	10 01	10 26	11 00	
27	07 27	07 50	08 14	08 43	09 00	09 20	09 44	10 14	10 30	10 48	11 09	11 37	12 18	
28	08 24	08 46	09 10	09 38	09 54	10 13	10 36	11 06	11 20	11 37	11 57	12 21	12 55	
29	09 20	09 40	10 02	10 27	10 42	10 58	11 19	11 44	11 56	12 10	12 26	12 45	13 08	
30	10 14	10 31	10 49	11 10	11 22	11 36	11 52	12 12	12 21	12 32	12 43	12 57	13 12	
Dec. 1	11 06	11 19	11 32	11 48	11 57	12 07	12 18	12 33	12 39	12 47	12 55	13 04	13 14	
2	11 55	12 03	12 12	12 22	12 27	12 34	12 41	12 50	12 54	12 58	13 03	13 08	13 14	
3	12 43	12 46	12 50	12 53	12 56	12 58	13 01	13 04	13 06	13 07	13 09	13 11	13 13	
4	13 31	13 29	13 27	13 24	13 23	13 22	13 20	13 18	13 17	13 16	13 15	13 14	13 12	
5	14 20	14 13	14 05	13 57	13 52	13 47	13 40	13 33	13 29	13 25	13 21	13 17	13 11	
6	15 12	14 59	14 47	14 32	14 24	14 14	14 03	13 50	13 44	13 37	13 29	13 21	13 11	
7	16 07	15 50	15 33	15 12	15 01	14 47	14 31	14 12	14 03	13 52	13 41	13 28	13 12	
8	17 07	16 46	16 25	16 00	15 45	15 28	15 07	14 42	14 30	14 16	14 00	13 40	13 16	
9	18 09	17 46	17 22	16 54	16 37	16 18	15 54	15 25	15 10	14 52	14 32	14 06	13 30	
10	19 11	18 48	18 24	17 55	17 38	17 19	16 54	16 23	16 08	15 50	15 27	14 59	14 17	
11	20 11	19 50	19 27	19 00	18 44	18 26	18 04	17 35	17 21	17 05	16 46	16 22	15 49	
12	21 06	20 48	20 28	20 05	19 52	19 36	19 17	18 54	18 43	18 30	18 15	17 58	17 35	
13	21 56	21 41	21 26	21 08	20 57	20 45	20 30	20 13	20 04	19 55	19 44	19 32	19 18	
14	22 41	22 31	22 20	22 07	21 59	21 50	21 40	21 28	21 22	21 16	21 09	21 01	20 52	
15	23 23	23 17	23 10	23 02	22 58	22 53	22 47	22 40	22 37	22 33	22 29	22 24	22 20	
16	..	..	23 58	23 56	23 55	23 53	23 51	23 49	23 48	23 47	23 46	23 44	23 43
17	00 02	00 01	..	..	..	..	..	..	..	..	..	..	..
18	00 41	00 44	00 46	00 49	00 50	00 52	00 54	00 57	00 58	00 59	01 01	01 02	01 04	
19	01 20	01 27	01 34	01 42	01 46	01 51	01 58	02 05	02 08	02 12	02 16	02 21	02 26	
20	02 01	02 12	02 23	02 36	02 44	02 52	03 02	03 15	03 20	03 27	03 34	03 42	03 51	
21	02 45	02 59	03 15	03 33	03 43	03 55	04 09	04 27	04 35	04 44	04 55	05 07	05 21	
22	03 32	03 50	04 09	04 32	04 45	05 00	05 19	05 42	05 53	06 05	06 20	06 36	06 57	
23	04 23	04 45	05 06	05 32	05 48	06 06	06 27	06 55	07 08	07 24	07 43	08 05	08 34	
24	05 18	05 40	06 05	06 33	06 50	07 09	07 33	08 03	08 18	08 36	08 57	09 24	10 03	
25	06 15	06 38	07 02	07 30	07 47	08 06	08 30	09 00	09 15	09 32	09 53	10 19	10 56	
26	07 13	07 34	07 56	08 22	08 38	08 56	09 17	09 43	09 56	10 11	10 28	10 49	11 14	
27	08 08	08 27	08 47	09 08	09 21	09 36	09 53	10 15	10 25	10 36	10 49	11 04	11 22	
28	09 02	09 17	09 31	09 48	09 58	10 09	10 22	10 38	10 45	10 53	11 02	11 12	11 24	
29	09 53	10 02	10 12	10 24	10 30	10 37	10 46	10 56	11 00	11 06	11 11	11 18	11 24	
30	10 41	10 46	10 50	10 56	10 59	11 02	11 06	11 11	11 13	11 15	11 18	11 21	11 24	
31	11 28	11 28	11 27	11 26	11 26	11 26	11 25	11 25	11 25	11 24	11 24	11 24	11 23	
32	12 16	12 10	12 04	11 58	11 54	11 50	11 45	11 39	11 36	11 33	11 30	11 26	11 22	

FOR NORTHERN STATIONS NOT ON THE MERIDIAN OF GREENWICH, AND
FOR SOUTHERN STATIONS.

For northern stations not on the meridian of Greenwich.—For longitudes twelve hours or less west from Greenwich obtain the data for the given latitude from the Table for the given date and for the date following; for longitudes twelve hours or less east from Greenwich obtain the data for the given latitude from the Table for the given date and for the date preceding. Subtract the time on the earlier date from the time on the later and multiply the difference by the twenty-fourth part of the longitude in hours and decimals of an hour, positive if west, and negative if east. Apply the product as a correction to the time on the given date.

For southern stations.—The instant of moonrise or moonset for any station south of the equator is within a few minutes that of moonset or moonrise, respectively, at a place of the same latitude north of the equator whose longitude is twelve hours different from that of the southern station.

If the southern station is twelve hours or less west from Greenwich, and the phenomenon at that station occurs between midnight and noon, the local civil day will be the same at the southern and northern stations. If, however, the phenomenon at the southern station occurs between noon and midnight, the local civil day at the northern station will be one day later than at the southern.

If the southern station is twelve hours or less east from Greenwich, and the phenomenon at that station occurs between midnight and noon, the local civil day at the northern station will be one day less than at the southern station. If, however, the phenomenon occurs between noon and midnight, the local civil day will be the same at the two stations.

Having thus determined the true civil day at the northern station, compute by the rule for northern latitudes. For the desired local mean time of moonrise at the southern station change the time of moonset at the northern station twelve hours, and *add* the correction computed by aid of the table below. For the desired local mean time of moonset at the southern station change the time of moonrise at the northern station twelve hours, and *subtract* the correction computed by aid of the table below. This correction, expressed in minutes of time, is equal to Moon's parallax in minutes of arc -50 multiplied by the factor taken from the table below. This factor is always positive and is the same for northern and southern declinations.

FACTOR FOR COMPUTING CORRECTION FOR SOUTHERN STATIONS.

Lat. δ	0°	10°	20°	30°	35°	40°	45°	50°	52°	54°	56°	58°	60°
0 00	.14	.14	.15	.16	.17	.18	.20	.22	.22	.24	.25	.26	.28
5 00	.14	.14	.15	.16	.17	.18	.20	.22	.23	.24	.25	.26	.28
10 00	.14	.14	.15	.16	.17	.18	.20	.22	.23	.25	.26	.28	.29
15 00	.14	.14	.15	.17	.18	.19	.21	.23	.25	.26	.28	.30	.32
20 00	.15	.15	.16	.17	.18	.20	.22	.25	.27	.29	.31	.34	.38
21 00	.15	.15	.16	.18	.19	.20	.23	.26	.28	.30	.32	.35	.40
22 00	.15	.15	.16	.18	.19	.21	.23	.26	.28	.30	.33	.37	.42
23 00	.15	.15	.16	.18	.19	.21	.23	.27	.29	.31	.34	.39	.44
24 00	.15	.15	.16	.18	.19	.21	.24	.28	.30	.32	.36	.41	.47
25 00	.15	.16	.16	.18	.20	.22	.24	.28	.31	.34	.38	.43	.52
26 00	.15	.16	.17	.18	.20	.22	.25	.29	.32	.35	.40	.46	.57
27 00	.16	.16	.17	.19	.20	.22	.26	.30	.33	.37	.42	.51	.66
28 00	.16	.16	.17	.19	.20	.23	.26	.31	.35	.39	.45	.56	.80
28 40	.16	.16	.17	.19	.21	.23	.27	.32	.36	.41	.48	.61	.98

FOR NORTHERN STATIONS NOT ON THE MERIDIAN OF GREENWICH, AND
FOR SOUTHERN STATIONS.

Summary of rule for Southern Stations.—Compute the opposite phenomenon for a fictitious northern station of the same latitude, but differing by 12^h in longitude, after correcting the date (if necessary) from the third column of the following table:—

Longitude of Southern Station.			Time of Opposite Phenomenon at Northern Station.	Correction to Date for Northern Station.	Final Correction Necessary.
West	..	..	$00 - 12$	$+1$	-12
			$12 - 24$	0	
East	..	..	$00 - 12$	0	$+12$
			$12 - 24$	-1	

To the time thus found apply 12^h with the sign shown in the last column of the table above. Compute the auxiliary correction Factor \times (Moon's parallax -50) and

Add for Moonrise at southern station.

Subtract for Moonset at southern station.

If the date thus given is not the one required (as may sometimes happen when the phenomenon occurs near 0^h or 12^h) a new calculation with a revised date will be necessary. It is to be remembered that on one day a month (near first quarter) there will be no moonset, and on one day (near last quarter) no moonrise.

Example.—1931, January 4, local civil date.—Find the time of moonrise and moonset in longitude $09^h 40^m$ east from Greenwich and in latitude $37^\circ 50'$ south.

The longitude of the fictitious northern station is $2^h 3'$ west from Greenwich and its latitude is $37^\circ 8' N$. In accordance with the precepts given above, the civil day at the northern station is January 3 for moonrise and January 4 for moonset.

At northern station—				Moonrise.	Moonset.
Table, Lat. $+37^\circ 8'$	..	..	..	Jan. $\begin{smallmatrix} d & h & m \\ 3 & 15 & 34 \end{smallmatrix}$	Jan. $\begin{smallmatrix} d & h & m \\ 4 & 07 & 29 \end{smallmatrix}$
Table, Lat. $+37^\circ 8'$	..	..	..	$4 \ 16 \ 41$	$5 \ 08 \ 24$
Difference	..	..	..	67	55
Product of Diff. by $+\frac{2.3}{24}$	..	..	..	$+6$	$+5$
Local mean time	..	..	..	Jan. $3 \ 15 \ 40$	Jan. $4 \ 07 \ 34$
Declination of Moon	..	..	..	$+28^\circ 2'$	$+28^\circ 0'$
Parallax of Moon	..	..	..	$59' 4''$	$59' 8''$
Factor from Table	..	..	..	$.22$	$.22$
Corr. = Factor \times (Parallax in minutes -50)				2^m	2^m
At southern station—				Moonset.	Moonrise.
Time at northern station changed 12^h				Jan. $\begin{smallmatrix} d & h & m \\ 4 & 03 & 40 \end{smallmatrix}$	Jan. $\begin{smallmatrix} d & h & m \\ 4 & 19 & 34 \end{smallmatrix}$
Correction	..	..	..	-2	$+2$
Local mean time	..	..	..	Jan. $4 \ 03 \ 38$	Jan. $4 \ 19 \ 36$

OBSERVATORIES.

LIST A.—ACTIVE OBSERVATORIES.

No.	Place.	Longitude.	Latitude.	Altitude.	Description.
1	Aarhus, Denmark ..	^h ^m ^s -00 40 47.3 b	+56 07 40	^m 50	Ole Römer Observatory.
2	Abbadia, France ..	+00 07 00.1 c	+43 22 52.2	69	Obs. of Paris Acad. of Sciences, Hendaye.
3	Adelaide, South Australia ..	-09 14 19.90a	-34 55 35.1	41	Government Observatory.
4	Albany,* New York ..	+04 55 07.12c	+42 39 12.8	70	Dudley Observatory.
5	Algiers, Algeria ..	-00 12 08.47c	+36 48 04.8	345	Algiers Obs., at Bouzaréah.
6	Allegheny,* Pennsylvania ..	+05 20 04.7 a	+40 28 58.1	370	Obs. of the Univ. of Pittsburgh.
7	Amherst,* Massachusetts ..	+04 50 05.9 a	+42 21 56	110	Amherst College Observatory.
8	Ann Arbor, Michigan ..	+05 34 55.27c	+42 16 48.7	282	Detroit Obs., Univ. of Michigan.
9	Ann Arbor, Michigan ..	+05 34 57.4	+42 16 32	250	Astr. Lab., Univ. of Michigan.
10	Apia, Samoa ..	+11 27 06	-13 48 26	2	Apia Observatory.
11	Appleton, Wisconsin ..	+05 53 35.89a	+44 15 39.0	242	Underwood Obs., Lawrence Coll.
12	Arcetri (Florence*), Italy ..	-00 45 01.30a	+43 45 14.4	184	Royal Astrophysical Obs.
13	Armagh, Northern Ireland ..	+00 26 35.48b	+54 21 11	64	Armagh Observatory.
14	Athens, Greece ..	-01 34 52.2 a	+37 58 15.5	110	National Observatory.
15	Bâle, Switzerland ..	-00 30 19.46a	+47 33 35.8	290	University Observatory.
16	Bamberg, Germany ..	-00 43 33.57	+49 53 06.0	288	Remeis Observatory.
17	Barcelona, Spain ..	-00 08 30.2	+41 24 59.3	415	Fabra Observatory.
18	Beirut,† Syria ..	-02 21 52.7 a	+33 54 22	38	Obs. of the American Univ.
19	Beloit, Wisconsin ..	+05 56 07.4 a	+42 30 08.4	245	Smith Obs., Beloit College.
20	Berea, Ohio ..	+05 27 24	+41 22 30	—	Smith Obs., Baldwin-Wallace College.
21	Bergedorf, Germany ..	-00 40 57.74c	+53 28 46.9	41	Hamburg* Observatory.
22	Berkeley, California ..	+08 09 02.91	+37 52 23.5	94	Students' Obs., Univ. of Calif.
23	Berlin*-Babelsberg, Ger- many	-00 52 25.49a	+52 24 24.2	82	University Observatory.
24	Berlin-Charlottenburg, Ger- many	-00 53 20.5 a	+52 30 48.7	60	Photographic Obs. of Technical High School.
25	Berlin, Germany ..	-00 53 27.40a	+52 31 30.7	—	University Obs. of Instruction.†
26	Berlin, Germany ..	-00 53 54.2 a	+52 29 07	38	Treptow Observatory.
27	Berne, Switzerland ..	-00 29 43.1	+46 57 13.6	550	Astr. Institute of the Univ.
28	Besançon, France ..	-00 23 57.1 c	+47 14 59	312	National Observatory.
29	Bethlehem, Pennsylvania ..	+05 01 31.96	+40 36 23.2	128	Sayre Obs., Lehigh University.
30	Blaca, Yugoslavia ..	-01 06 08.7	+43 17 38	460	Observatory of Nikola Milicević.
31	Bloemfontein, South Africa	-01 44 57	-29 05 45	1490	Lamont-Hussey Observatory of the University of Michigan.
32	Bloemfontein, South Africa	-01 45 57 a	-29 12	1379	Boyden Station of Harvard Coll. Observatory at Mazelspoort.
33	Bloomington, Indiana ..	+05 46 05 a	+39 09 54	238	Kirkwood Obs., Univ. of Indiana.
34	Bogota, Colombia ..	+04 56 19.51	+ 4 35 55.2	2640	National Obs. of S. Bartolome.
35	Bologna, Italy ..	-00 45 24.48a	+44 29 52.8	84	Royal University Observatory.

*See also List B. a Equatorial refractor. b Equatorial reflector. c Transit or meridian circle.

†See also Ksara. ‡ Urania Observatory, 1889-1913.

OBSERVATORIES.

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LIST A.—ACTIVE OBSERVATORIES.

No.	Natural Values of					Logarithms of				
	$\rho \sin \phi'$	$\rho \cos \phi'$	$\tan \phi'$	$\frac{\sin \phi'}{\rho \cos \phi'}$	$\frac{8 \cdot 80 \times}{\rho \sin \phi'}$	$\rho \sin \phi'$	$\rho \cos \phi'$	$\tan \phi'$	$\frac{\sin \phi'}{\rho \cos \phi'}$	$\frac{8 \cdot 80 \times}{\rho \sin \phi'}$
1	+0.82663	0.55864	+1.47970	0.328	+7.27	9.91731	9.74713	0.17017	9.516	0.862
2	+0.68332	0.72796	+0.93868	0.427	+6.01	9.83463	9.86211	9.97252	9.631	0.779
3	-0.56931	0.82080	-0.69360	0.482	-5.01	9.75535 ⁿ	9.91424	9.84111 ⁿ	9.683	0.700 ⁿ
4	+0.67406	0.73661	+0.91508	0.432	+5.93	9.82870	9.86724	9.96146	9.636	0.773
5	+0.59577	0.80173	+0.74310	0.470	+5.24	9.77508	9.90403	9.87105	9.672	0.720
6	+0.64581	0.76173	+0.84782	0.447	+5.68	9.81010	9.88180	9.92831	9.650	0.755
7	+0.67036	0.74000	+0.90589	0.434	+5.90	9.82631	9.86923	9.95708	9.638	0.771
8	+0.66928	0.74102	+0.90319	0.435	+5.89	9.82561	9.86983	9.95578	9.638	0.770
9	+0.66922	0.74108	+0.90304	0.435	+5.89	9.82557	9.86986	9.95571	9.638	0.770
10	-0.23710	0.97129	-0.24411	0.570	-2.09	9.37493 ⁿ	9.98735	9.38758 ⁿ	9.756	0.319 ⁿ
11	+0.69440	0.71737	+0.96797	0.421	+6.11	9.84161	9.85575	9.98586	9.624	0.786
12	+0.68804	0.72350	+0.95099	0.424	+6.05	9.83761	9.85944	9.97818	9.628	0.782
13	+0.80897	0.58409	+1.38500	0.343	+7.12	9.90793	9.76648	0.14145	9.535	0.852
14	+0.61192	0.78934	+0.77522	0.463	+5.38	9.78669	9.89726	9.88943	9.666	0.731
15	+0.73440	0.67609	+1.08625	0.397	+6.46	9.86593	9.83000	0.03593	9.598	0.810
16	+0.76114	0.64562	+1.17893	0.379	+6.70	9.88147	9.80998	0.07149	9.578	0.826
17	+0.65809	0.75108	+0.87620	0.441	+5.79	9.81829	9.87568	9.94260	9.644	0.763
18	+0.55467	0.83083	+0.66761	0.487	+4.88	9.74403	9.91951	9.82452	9.688	0.689
19	+0.67214	0.73841	+0.91025	0.433	+5.91	9.82746	9.86830	9.95916	9.637	0.772
20	+0.65751	0.75150	+0.87492	0.441	+5.79	9.81790	9.87593	9.94197	9.644	0.762
21	+0.79999	0.59641	+1.34134	0.350	+7.04	9.90308	9.77554	0.12754	9.544	0.848
22	+0.61057	0.79039	+0.77250	0.464	+5.37	9.78574	9.89784	9.88790	9.666	0.730
23	+0.78871	0.61135	+1.29011	0.359	+6.94	9.89692	9.78629	0.11063	9.555	0.841
24	+0.78984	0.60987	+1.29510	0.358	+6.95	9.89754	9.78524	0.11230	9.554	0.842
25	+0.78996	0.60970	+1.29564	0.358	+6.95	9.89761	9.78512	0.11249	9.554	0.842
26	+0.78954	0.61026	+1.29378	0.358	+6.95	9.89737	9.78552	0.11186	9.554	0.842
27	+0.72726	0.68388	+1.06344	0.401	+6.40	9.86169	9.83498	0.02671	9.603	0.806
28	+0.73074	0.68007	+1.07451	0.399	+6.43	9.86377	9.83255	0.03121	9.601	0.808
29	+0.64742	0.76030	+0.85154	0.446	+5.70	9.81119	9.88098	9.93020	9.649	0.756
30	+0.68226	0.72905	+0.93582	0.428	+6.00	9.83395	9.86276	9.97119	9.631	0.778
31	-0.48350	0.87471	-0.55276	0.513	-4.25	9.68440 ⁿ	9.94186	9.74253 ⁿ	9.710	0.629 ⁿ
32	-0.48507	0.87381	-0.55512	0.513	-4.27	9.68581 ⁿ	9.94142	9.74439 ⁿ	9.710	0.630 ⁿ
33	+0.62818	0.77640	+0.80909	0.455	+5.53	9.79808	9.89009	9.90800	9.658	0.743
34	+0.07967	0.99721	+0.07989	0.585	+0.70	8.90130	9.99879	8.90252	9.767	9.846
35	+0.69733	0.71446	+0.97602	0.419	+6.14	9.84344	9.85398	9.98946	9.622	0.788

OBSERVATORIES.

LIST A.—ACTIVE OBSERVATORIES.

No.	Place.	Longitude.	Latitude.	Altitude.	Description.
36	Bombay,† India	^{h m s} -04 51 15.60	+18° 53' 36".2	m 19	Government Obs., at Colaba.
37	Bonn, Germany	-00 28 23.18	+50 43 45.0	62	University Observatory.
38	Bordeaux, France	+00 02 06.5 c	+44 50 07	73	Obs. of Univ. of Bordeaux. Floirac.
39	Boston,* Massachusetts ..	+04 44 19.1 a	+42 20 58	31	Boston University Observatory.
40	Breslau,* Germany	-01 08 21.19a	+51 06 41	117	University Observatory.
41	Brisbane,* Queensland ..	-10 12 06.48c	-27 28 23.0	51	Time Service Station.
42	Bucharest, Romania	-01 44 27.01c	+44 24 34.2	85	Military Observatory.
43	Budapest, Hungary	-01 15 52.0	+47 29 59	474	National Obs., on Svábhegy Mountain.
44	Budapest, Hungary	-01 16 15.4 a	+47 29 34.7	110	University Observatory.
45	Budapest, Hungary	-01 16 13.7	+47 28 49	110	Geodetic Obs. of Royal Joseph Technical High School.
46	Cambridge, England	-00 00 22.75c	+52 12 51.6	28	University Observatory.
47	Cambridge, England	-00 00 22.5	+52 12 49	30	Solar Physics Observatory.
48	Cambridge, Massachusetts ..	+04 44 31.05	+42 22 47.6	24	Harvard College Observatory.*
49	Canberra, Australia	-09 56 00	-35 19 30	808	Commonwealth Solar Obs., Mt. Stromlo.
50	Cape of Good Hope, S. Afr.	-01 13 54.54c	-33 56 02.5	8	Royal Observatory.
51	Caracas, Venezuela	+04 27 43.3 a	+10 30 24.4	1042	Cajigal Observatory.
52	Carloforte, Sardinia	-00 33 14.9	+39 08 08.9	18	International Latitude Obs.
53	Catania (Sicily), Italy	-01 00 20.6	+37 30 13	47	Royal Astrophysical Obs.
54	Charlottesville, Virginia ..	+05 14 05.33a	+38 02 01.2	259	Leander McCormick Observa- tory, University of Virginia.
55	Cincinnati,* Ohio	+05 37 41.40a	+39 08 19.8	247	Cincinnati Observatory.
56	Claremont, California	+07 50 50.16	+34 05 33.2	368	Brackett Obs., Pomona College.
57	Cleveland, Ohio	+05 26 16.36c	+41 32 13.1	247	Warner and Swasey Obs.†
58	Coimbra, Portugal	+00 33 43.1	+40 12 24.5	99	University Observatory.
59	Colombo, Ceylon	-05 19 28.69	+6 54 18	6	Colombo Observatory.
60	Columbia, Missouri	+06 09 18	+38 56 12	225	Laws Obs., Univ. of Missouri.
61	Columbus, Ohio	+05 32 02.6 a	+39 59 50.4	233	McMillin Obs., State Univ.
62	Copenhagen,* Denmark ..	-00 50 18.69a	+55 41 12.6	14	University Observatory.
63	Copenhagen, Denmark ..	-00 50 09.11a	+55 41 19.2	10	Urania Observatory.
64	Cordoba, Argentina	+04 16 48.22	-31 25 15.5	434	National Observatory.
65	Corfu, Greece	-01 24 22	+39 30 00	120	Corfu Observatory.
66	Cracow, Poland	-01 19 50.3	+50 03 52.0	221	University Observatory.
67	Danzig, Danzig	-01 14 39.6 a	+54 21 18.0	3	Obs. of Natural History Society.
68	Danzig, Danzig	-01 14 27	+54 23 42	—	State Observatory.
69	Dehra Dün,‡ India	-05 12 11.76	+30 18 51.8	682	Haig Obs., Trig. Survey of India.
70	Delaware, Ohio	+05 32 18	+40 17 55	287	Perkins Obs., Wesleyan Univ.

* See also List B. a Equatorial refractor. b Equatorial reflector. c Transit or meridian circle.
† The geodetic co-ordinates are -04° 51' 15".15 and +18° 53' 46".5. ‡ Formerly the Case Observatory.
§ The geodetic co-ordinates are -05° 12' 13".47 and +30° 19' 28".7.

OBSERVATORIES.

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LIST A.—ACTIVE OBSERVATORIES.

No.	Natural Values of					Logarithms of				
	$\rho \sin \phi'$	$\rho \cos \phi'$	$\tan \phi'$	$\frac{8.80 \times}{\rho \cos \phi'}$	$\frac{8.80 \times}{\rho \sin \phi'}$	$\rho \sin \phi'$	$\rho \cos \phi'$	$\tan \phi'$	$\frac{8.80 \times}{\rho \cos \phi'}$	$\frac{8.80 \times}{\rho \sin \phi'}$
36	+0.32175	0.94646	+0.33995	0.555	+2.83	9.50751	9.97610	9.53141	9.744	0.452
37	+0.77052	0.63427	+1.21481	0.372	+6.78	9.88678	9.80228	0.08451	9.571	0.831
38	+0.70151	0.71033	+0.98758	0.417	+6.17	9.84604	9.85146	9.99457	9.620	0.791
39	+0.67015	0.74018	+0.90538	0.434	+5.90	9.82617	9.86934	9.95683	9.638	0.771
40	+0.77473	0.62910	+1.23148	0.369	+6.82	9.88915	9.79872	0.09043	9.567	0.834
41	-0.45856	0.88787	-0.51647	0.521	-4.04	9.66140 ⁿ	9.94835	9.71305 ⁿ	9.717	0.606 ⁿ
42	+0.69623	0.71555	+0.97301	0.420	+6.13	9.84276	9.85464	9.98812	9.623	0.787
43	+0.73372	0.67688	+1.08396	0.397	+6.46	9.86553	9.83051	0.03501	9.599	0.810
44	+0.73359	0.67693	+1.08371	0.397	+6.46	9.86545	9.83054	0.03491	9.599	0.810
45	+0.73344	0.67709	+1.08322	0.397	+6.45	9.86537	9.83065	0.03472	9.599	0.810
46	+0.78665	0.61400	+1.28119	0.360	+6.92	9.89578	9.78817	0.10761	9.557	0.840
47	+0.78664	0.61401	+1.28115	0.360	+6.92	9.89578	9.78818	0.10760	9.557	0.840
48	+0.67054	0.73983	+0.90635	0.434	+5.90	9.82642	9.86913	9.95729	9.638	0.771
49	-0.57505	0.81691	-0.70393	0.479	-5.06	9.75970 ⁿ	9.91217	9.84753 ⁿ	9.681	0.704 ⁿ
50	-0.55509	0.83054	-0.66834	0.487	-4.88	9.74436 ⁿ	9.91936	9.82500 ⁿ	9.688	0.689 ⁿ
51	+0.18118	0.98350	+0.18421	0.577	+1.59	9.25810	9.99278	9.26532	9.761	0.203
52	+0.62776	0.77670	+0.80825	0.456	+5.52	9.79779	9.89025	9.90754	9.659	0.742
53	+0.60548	0.79431	+0.76227	0.466	+5.33	9.78210	9.89999	9.88211	9.668	0.727
54	+0.61279	0.78869	+0.77697	0.463	+5.39	9.78731	9.89691	9.89041	9.665	0.732
55	+0.62782	0.77669	+0.80833	0.456	+5.52	9.79784	9.89025	9.90759	9.659	0.742
56	+0.55738	0.82906	+0.67231	0.486	+4.90	9.74615	9.91858	9.82757	9.687	0.691
57	+0.65965	0.74967	+0.87992	0.440	+5.80	9.81931	9.87487	9.94444	9.643	0.764
58	+0.64212	0.76480	+0.83959	0.449	+5.65	9.80762	9.88355	9.92407	9.652	0.752
59	+0.11942	0.99280	+0.12029	0.582	+1.05	9.07708	9.99686	9.08022	9.765	0.022
60	+0.62509	0.77890	+0.80252	0.457	+5.50	9.79594	9.89148	9.90446	9.660	0.740
61	+0.63934	0.76717	+0.83338	0.450	+5.63	9.80573	9.88489	9.92084	9.653	0.750
62	+0.82231	0.56501	+1.45537	0.331	+7.24	9.91503	9.75206	0.16297	9.520	0.860
63	+0.82232	0.56499	+1.45547	0.331	+7.24	9.91504	9.75204	0.16300	9.520	0.860
64	-0.51833	0.85420	-0.60680	0.501	-4.56	9.71460 ⁿ	9.93156	9.78304 ⁿ	9.700	0.659 ⁿ
65	+0.63268	0.77269	+0.81879	0.453	+5.57	9.80118	9.88801	9.91317	9.656	0.746
66	+0.76315	0.64322	+1.18645	0.377	+6.72	9.88261	9.80836	0.07425	9.577	0.827
67	+0.80898	0.58406	+1.38510	0.343	+7.12	9.90794	9.76646	0.14148	9.535	0.852
68	+0.80938	0.58349	+1.38714	0.342	+7.12	9.90815	9.76603	0.14212	9.534	0.853
69	+0.50184	0.86410	+0.58076	0.507	+4.42	9.70056	9.93656	9.76400	9.705	0.645
70	+0.64336	0.76379	+0.84232	0.448	+5.66	9.80845	9.88298	9.92548	9.651	0.753

LIST A.—ACTIVE OBSERVATORIES.

No.	Place.	Longitude.	Latitude.	Altitude.	Description.
71	Denver, Colorado ..	+06 ^h 59 ^m 47 ^s ·72a	+39° 40' 36"·4	1644 ^m	Chamberlin Obs., Univ. of Denver.
72	Des Moines, Iowa ..	+06 14 36·38	+41 35 40	296	Drake University Observatory.
73	Dresden, * Germany ..	-00 54 55·1	+51 01 49·3	168	Geodetic Institute of Technical High School.
74	Dublin, Irish Free State ..	+00 25 21·1 c	+53 23 13·1	86	Dunsink Obs., Trinity College.
75	Dunedin, New Zealand ..	-11 21 58·05b	-45 52 25·9	200	Observatory of Otago Institute.
76	Durban, * South Africa ..	-02 04 01·18	-29 50 47	79	Obs. of Natal Technical College.
77	Durham, England ..	+00 06 19·75	+54 46 06·2	108	University Observatory.
78	Düsseldorf, Germany ..	-00 27 02·69a	+51 12 25	46	Municipal Observatory.
79	Edinburgh, * Scotland ..	+00 12 44·1 b	+55 55 30	146	Royal Observatory.
80	Elmira, New York ..	+05 07 13·9	+42 06 25	—	Elmira College Observatory.
81	Evanston, † Illinois ..	+05 50 42·3	+42 03 33·4	175	Dearborn Obs., Northwestern University.
82	Ewhurst (Surrey), England	+00 01 47	+51 10 09	191	Observatory of J. Evershed.
83	Fayette, Missouri ..	+06 11 18·1	+39 16 16·8	745	Morrison Obs., Central College.
84	Flagstaff, Arizona ..	+07 26 44·6	+35 12 30·5	2210	Lowell Observatory.
85	Florence, * Italy ..	-00 45 02·5	+43 46 49·4	72	Military Geographical Institute.
86	Frankfurt am Main, Germany	-00 34 36·3 c	+50 07 00	121	University Observatory.
87	Frome (Somerset), England	+00 09 29·1	+51 13 24	110	Observatory of C. S. Saxton.
88	Geneva, New York ..	+05 08 01	+42 52 46·2	152	Smith Observatory.
89	Geneva, Switzerland ..	-00 24 36·53c	+46 11 59·3	406	Geneva Observatory.
90	Genoa, Italy ..	-00 35 41·28c	+44 25 08·1	108	Royal Marine Hydrographic Institute.
91	Glasgow, Scotland ..	+00 17 10·55c	+55 52 42·1	55	University Observatory.
92	Gotha, * Germany ..	-00 42 50·51a	+50 56 37·9	322	Ducal Observatory.
93	Göttingen, Germany ..	-00 39 46·22c	+51 31 48·2	161	University Observatory.
94	Granada, Spain ..	+00 14 22·13a	+37 11 13	775	Cartuja Observatory.
95	Graz, Austria ..	-01 01 47·71a	+47 04 37·2	375	University Observatory.
96	Greencastle, Indiana ..	+05 47 24·36	+39 38 46·6	262	McKim Obs., De Pauw Univ.
97	Greenwich, England ..	00 00 00·00c	+51 28 38·2	47	Royal Observatory.
98	Groningen, Holland ..	-00 26 15·11	+53 13 13·8	—	Kapteyn Astr. Laboratory.
99	Hamburg, * † Germany ..	-00 39 53·42	+53 32 51·8	30	Marine Observatory.
100	Hanover, New Hampshire ..	+04 49 08	+43 42 15·3	183	Shattuck Obs., Dartmouth Coll.
101	Haverford, Pennsylvania ..	+05 01 12·7	+40 00 40·1	116	Haverford College Observatory.
102	Headley (Surrey), England	+00 01 04·15a	+51 16 32·2	174	Observatory of T. E. R. Phillips.
103	Heidelberg, * † Germany ..	-00 34 52·95	+49 23 55·7	570	Baden Obs., at Königstuhl.
104	Helsingfors, Finland ..	-01 39 49·10c	+60 09 42·3	33	University Observatory. †
105	Helwan, Egypt ..	-02 05 21·8	+29 51 31·1	115	Helwan Observatory.

* See also List B. a Equatorial refractor. b Equatorial reflector. c Transit or meridian circle.

† Transferred from Chicago in 1888.

‡ See also Bergedorf.

§ At Schwetzingen 1762-1775, at Mannheim* 1775-1880, at Karlsruhe* 1880-1896. || Formerly at Åbo.*

OBSERVATORIES.

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LIST A.—ACTIVE OBSERVATORIES.

No.	Natural Values of					Logarithms of				
	$\rho \sin \phi'$	$\rho \cos \phi'$	$\tan \phi'$	$\frac{A \cdot \sin \phi}{\rho \cos \phi'}$	$\frac{8 \cdot 80 \times}{\rho \sin \phi'}$	$\rho \sin \phi'$	$\rho \cos \phi'$	$\tan \phi'$	$\frac{A \cdot \sin \phi}{\rho \cos \phi'}$	$\frac{8 \cdot 80 \times}{\rho \sin \phi'}$
71	+0.63520	0.77091	+0.82396	0.452	+5.59	9.80291	9.88701	9.91590	9.655	0.747
72	+0.66040	0.74901	+0.88170	0.439	+5.81	9.81981	9.87449	9.94532	9.643	0.764
73	+0.77385	0.63021	+1.22793	0.370	+6.81	9.88866	9.79948	0.08917	9.568	0.833
74	+0.79903	0.59771	+1.33681	0.351	+7.03	9.90256	9.77649	0.12607	9.545	0.847
75	-0.71424	0.69747	-1.02405	0.409	-6.29	9.85385 ⁿ	9.84353	0.01032 ⁿ	9.612	0.798 ⁿ
76	-0.49475	0.86810	-0.56992	0.509	-4.35	9.69438 ⁿ	9.93857	9.75582 ⁿ	9.707	0.639 ⁿ
77	+0.81318	0.57819	+1.40641	0.339	+7.16	9.91018	9.76207	0.14811	9.530	0.855
78	+0.77577	0.62780	+1.23569	0.368	+6.83	9.88973	9.79782	0.09191	9.566	0.834
79	+0.82466	0.56159	+1.46844	0.329	+7.26	9.91627	9.74942	0.16686	9.518	0.861
80	+0.66702	0.74302	+0.89771	0.436	+5.87	9.82414	9.87100	9.95314	9.639	0.769
81	+0.66642	0.74359	+0.89621	0.436	+5.86	9.82375	9.87134	9.95241	9.640	0.768
82	+0.77537	0.62833	+1.23403	0.369	+6.82	9.88951	9.79818	0.09132	9.567	0.834
83	+0.62966	0.77529	+0.81216	0.455	+5.54	9.79911	9.88947	9.90964	9.658	0.744
84	+0.57352	0.81826	+0.70090	0.480	+5.05	9.75855	9.91289	9.84566	9.681	0.703
85	+0.68836	0.72317	+0.95187	0.424	+6.06	9.83782	9.85924	9.97858	9.628	0.782
86	+0.76372	0.64251	+1.18865	0.377	+6.72	9.88293	9.80788	0.07505	9.576	0.827
87	+0.77595	0.62758	+1.23642	0.368	+6.83	9.88984	9.79767	0.09217	9.566	0.834
88	+0.67695	0.73395	+0.92235	0.431	+5.96	9.83056	9.86566	9.96490	9.634	0.775
89	+0.71821	0.69340	+1.03577	0.407	+5.29	9.85625	9.84099	0.01526	9.609	0.801
90	+0.69635	0.71543	+0.97333	0.420	+6.13	9.84283	9.85457	9.98826	9.623	0.787
91	+0.82419	0.56225	+1.46587	0.330	+7.25	9.91603	9.74993	0.16610	9.518	0.861
92	+0.77292	0.63139	+1.22414	0.370	+6.80	9.88813	9.80030	0.08783	9.569	0.833
93	+0.77930	0.62341	+1.25007	0.366	+6.86	9.89170	9.79477	0.09693	9.563	0.836
94	+0.60117	0.79774	+0.75358	0.468	+5.29	9.77899	9.90186	9.87713	9.670	0.723
95	+0.72870	0.68229	+1.06803	0.400	+6.41	9.86255	9.83397	0.02859	9.602	0.807
96	+0.63465	0.77109	+0.82306	0.452	+5.58	9.80254	9.88710	9.91543	9.655	0.747
97	+0.77871	0.62411	+1.24770	0.366	+6.85	9.89138	9.79526	0.09611	9.564	0.836
98	†	—	—	—	—	—	—	—	—	—
99	+0.80069	0.59545	+1.34468	0.349	+7.05	9.90347	9.77485	0.12862	9.543	0.848
100	+0.68742	0.72410	+0.94934	0.425	+6.05	9.83722	9.85980	9.97742	9.628	0.782
101	+0.63952	0.76700	+0.83379	0.450	+5.63	9.80585	9.88480	9.92106	9.653	0.750
102	+0.77653	0.62688	+1.23873	0.368	+6.83	9.89016	9.79718	0.09298	9.566	0.835
103	+0.75569	0.65211	+1.15883	0.383	+6.65	9.87834	9.81432	0.06402	9.583	0.823
104	+0.86379	0.49882	+1.73168	0.293	+7.60	9.93641	9.69794	0.23847	9.466	0.881
105	+0.49494	0.86800	+0.57021	0.509	+4.36	9.69455	9.93852	9.75603	9.707	0.639

† No telescopic equipment.

OBSERVATORIES.

LIST A.—ACTIVE OBSERVATORIES.

No.	Place.	Longitude.	Latitude.	Altitude.	Description.
106	Hem (Nord), France ..	^{h m s} -00 12 44.47	^{° ' "} +50 39 37	^m 53	Obs. of the Univ. of Lille.
107	Herne (Kent), England ..	-00 04 27.72a	+51 21 18.1	14	Observatory of B. M. Peek.
108	Herrsching, Germany ..	-00 44 43.6	+47 59 55	534	Observatory of Dr. Strebel.
109	Hong Kong, China..	-07 36 41.25c	+22 18 13.2	33	Royal Observatory.
110	Hudson, Ohio ..	+05 25 44.2	+41 14 43	—	Obs. of Western Reserve Acad.
111	Hyderabad, India ..	-05 13 48.98	+17 25 54.3	554	Nizamiah Observatory.
112	Innsbruck, Austria ..	-00 45 31.42	+47 16 07.7	605	University Observatory.
113	Iowa City, Iowa ..	+06 06 08	+41 39 44	221	Obs. of University of Iowa.
114	Ithaca,* New York ..	+05 05 54.3	+42 27 10.4	270	Fuertes Obs., Cornell Univ.
115	Jassy, Romania ..	-01 50 28	+47 11 28	128	University Observatory.
116	Jena,* Germany ..	-00 46 20.22a	+50 55 34.8	164	University Observatory.
117	Johannesburg, South Africa	-01 52 17.9 a	-26 10 52.1	1786	Union Observatory.†
118	Johannesburg, South Africa	-01 52 07 a	-26 11 14	1741	Branch of Yale University Obs.
119	Juvisy, France ..	-00 09 29.0	+48 41 37	92	M. Flammarion's Observatory.
120	Kalocsa, Hungary ..	-01 15 54.34	+46 31 42.4	102	Haynald Observatory.
121	Kasan, Russia ..	-03 15 15.74c	+55 50 20.5	98	Engelhardt Observatory.‡
122	Kasan, Russia ..	-03 16 29.03a	+55 47 24.3	79	University Observatory.
123	Kharkov (Ukraine), Russia	-02 24 55.72c	+50 00 09.9	139	Kharkov Observatory.
124	Kiel, Germany ..	-00 40 35.45c	+54 20 27.6	52	University Observatory.§
125	Kiev (Ukraine), Russia ..	-02 02 00.45a	+50 27 10.0	184	Astronomical Observatory.
126	Kingswood (Surrey), Eng.	+00 00 50.25b	+51 17 34.1	157	Obs. of F. J. Hargreaves.
127	Kodaikanal, India..	-05 09 52.0	+10 13 50	2343	Solar Physics Observatory.
128	Königsberg, Germany ..	-01 21 58.98	+54 42 50.6	22	University Observatory.
129	Konstanz, Germany ..	-00 36 42.01	+47 39 43.6	420	Observatory of E. Leiner.
130	Kremsmünster, Austria ..	-00 56 32.03	+48 03 30.2	382	Obs. of the Benedictines.
131	Ksara, Syria ..	-02 23 33.7	+33 49 25.6	923	Ksara Observatory.||
132	Kyoto, Japan ..	-09 03 06.7	+35 01 37.1	55	Obs. of Kyoto Imperial Univ.
133	Landstuhl, Germany ..	-00 30 16.32	+49 24 42.9	380	Observatory of P. Fauth.
134	La Paz, Bolivia ..	+04 32 31.85	-16 29 43	3659	Obs. of College of San Calixto.
135	La Plata, Argentina ..	+03 51 43.74c	-34 54 30.3	17	National University Obs.
136	Leiden,* Holland ..	-00 17 56.15c	+52 09 19.8	6	University Observatory.
137	Leipzig,* Germany ..	-00 49 33.93a	+51 20 05.9	119	University Observatory.
138	Leiston (Suffolk), England	-00 06 18.0	+52 12 02.1	20	Observatory of A. F. Bennett.
139	Lembang, Java ..	-07 10 27.73	-6 49 32.9	1300	Bosscha Observatory.
140	Lemberg, Poland ..	-01 36 08	+49 49 57.6	330	Astr. Institute of the Univ.
141	Lemberg, Poland ..	-01 36 03.40	+49 50 11.2	340	Obs. of Technical High School.
142	Leningrad, Russia..	-02 01 10.82	+59 56 32.2	3	University Observatory.
143	Leonia, New Jersey ..	+04 55 57.3	+40 51 50.5	49	Obs. of J. Ernest G. Yalden.

* See also List B. a Equatorial refractor. b Equatorial reflector. c Transit or meridian circle.

† Formerly Transvaal Observatory.

‡ Formerly at Dresden.*

§ Formerly at Altona.*

|| At Saâd-Nail, near Beirut.

OBSERVATORIES.

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LIST A.—ACTIVE OBSERVATORIES.

No.	Natural Values of					Logarithms of				
	$\rho \sin \phi'$	$\rho \cos \phi'$	$\tan \phi'$	$\frac{\sin \phi}{\rho \cos \phi'}$	$\frac{8 \cdot 80 \times}{\rho \sin \phi'}$	$\rho \sin \phi'$	$\rho \cos \phi'$	$\tan \phi'$	$\frac{\sin \phi}{\rho \cos \phi'}$	$\frac{8 \cdot 80 \times}{\rho \sin \phi'}$
106	+0.76976	0.63520	+1.21183	0.373	+6.77	9.88635	9.80291	0.08344	9.571	0.831
107	+0.77738	0.62578	+1.24226	0.367	+6.84	9.89063	9.79642	0.09421	9.565	0.835
108	+0.73957	0.67045	+1.10309	0.393	+6.51	9.86898	9.82637	0.04261	9.595	0.813
109	+0.37715	0.92564	+0.40745	0.543	+3.32	9.57651	9.96644	9.61007	9.735	0.521
110	+0.65581	0.75300	+0.87094	0.442	+5.77	9.81678	9.87679	9.93999	9.645	0.761
111	+0.29767	0.95445	+0.31188	0.560	+2.62	9.47374	9.97975	9.49399	9.748	0.418
112	+0.73100	0.67986	+1.07523	0.399	+6.43	9.86392	9.83242	0.03150	9.601	0.808
113	+0.66128	0.74821	+0.88380	0.439	+5.82	9.82038	9.87403	9.94636	9.642	0.765
114	+0.67150	0.73900	+0.90867	0.434	+5.91	9.82705	9.86864	9.95841	9.637	0.772
115	+0.73003	0.68080	+1.07231	0.399	+6.42	9.86334	9.83302	0.03032	9.601	0.808
116	+0.77271	0.63161	+1.22339	0.371	+6.80	9.88801	9.80045	0.08756	9.569	0.832
117	-0.43865	0.89824	-0.48835	0.527	-3.86	9.64212 ⁿ	9.95339	9.68873 ⁿ	9.722	0.587 ⁿ
118	-0.43875	0.89819	-0.48848	0.527	-3.86	9.64221 ⁿ	9.95337	9.68885 ⁿ	9.722	0.587 ⁿ
119	+0.74757	0.66135	+1.13037	0.388	+6.58	9.87365	9.82043	0.05322	9.589	0.818
120	+0.72213	0.68923	+1.04774	0.404	+6.35	9.85861	9.83836	0.02025	9.607	0.803
121	+0.82381	0.56283	+1.46371	0.330	+7.25	9.91583	9.75037	0.16545	9.519	0.860
122	+0.82333	0.56353	+1.46102	0.331	+7.25	9.91557	9.75092	0.16466	9.519	0.860
123	+0.76245	0.64404	+1.18386	0.378	+6.71	9.88221	9.80891	0.07330	9.577	0.827
124	+0.80884	0.58426	+1.38438	0.343	+7.12	9.90786	9.76661	0.14126	9.535	0.852
125	+0.76747	0.63801	+1.20292	0.374	+6.75	9.88506	9.80483	0.08024	9.573	0.830
126	+0.77672	0.62664	+1.23949	0.368	+6.84	9.89026	9.79702	0.09324	9.565	0.835
127	+0.17650	0.98457	+0.17927	0.578	+1.55	9.24674	9.99325	9.25350	9.762	0.191
128	+0.81262	0.57896	+1.40359	0.340	+7.15	9.90989	9.76265	0.14724	9.531	0.854
129	+0.73562	0.67479	+1.09015	0.396	+6.47	9.86665	9.82917	0.03749	9.598	0.811
130	+0.74025	0.66966	+1.10541	0.393	+6.51	9.86938	9.82585	0.04352	9.594	0.814
131	+0.55356	0.83174	+0.66554	0.488	+4.87	9.74316	9.91999	9.82317	9.688	0.688
132	+0.57074	0.81980	+0.69620	0.481	+5.02	9.75644	9.91371	9.84273	9.682	0.701
133	+0.75581	0.65192	+1.15937	0.382	+6.65	9.87841	9.81419	0.06422	9.583	0.823
134	-0.28227	0.95965	-0.29413	0.563	-2.48	9.45066 ⁿ	9.98211	9.46855 ⁿ	9.751	0.395 ⁿ
135	-0.56905	0.82097	-0.69314	0.482	-5.01	9.75515 ⁿ	9.91433	9.84082 ⁿ	9.683	0.700 ⁿ
136	+0.78602	0.61481	+1.27847	0.361	+6.92	9.89543	9.78874	0.10669	9.557	0.840
137	+0.77717	0.62606	+1.24136	0.367	+6.84	9.89052	9.79662	0.09390	9.565	0.835
138	+0.78650	0.61419	+1.28055	0.360	+6.92	9.89570	9.78830	0.10740	9.557	0.840
139	-0.11808	0.99313	-0.11890	0.583	-1.04	9.07218 ⁿ	9.99702	9.07516 ⁿ	9.765	0.017 ⁿ
140	+0.76056	0.64633	+1.17675	0.379	+6.69	9.88113	9.81045	0.07068	9.579	0.826
141	+0.76060	0.64628	+1.17690	0.379	+6.69	9.88116	9.81042	0.07074	9.579	0.826
142	+0.86188	0.50214	+1.71641	0.295	+7.58	9.93544	9.70082	0.23462	9.469	0.880
143	+0.65081	0.75736	+0.85931	0.444	+5.73	9.81345	9.87930	9.93415	9.648	0.758

OBSERVATORIES.

LIST A.—ACTIVE OBSERVATORIES.

No.	Place	Longitude.	Latitude.	Altitude.	Description.
144	Liège, Belgium	^h ^m ^s —00 22 15.42	+50° 37' 06"	^m 127	University Obs., at Cointe.
145	Lisbon (Tapada), Portugal	+00 36 44.68 ^a	+38 42 30.5	95	Lisbon Observatory.
146	Liverpool,* England ..	+00 12 17.33	+53 24 04.8	62	Liverpool Obs., at Bidston.
147	Lourenço Marques, Portuguese East Africa	—02 10 22.63	—25 58 05.5	60	Campos Rodrigues Observatory.
148	Lovedale, South Africa ..	—01 47 25	—32 46 30	52	Observatory of A. W. Roberts.
149	Lund, Sweden	—00 52 44.97	+55 41 51.6	34	Royal University Observatory.
150	Lyons, France	—00 19 08.5	+45 41 41	299	Univ. Obs. at Saint-Genis-Laval.
151	Madison, Wisconsin ..	+05 57 37.90 ^c	+43 04 36.8	292	Washburn Obs., University of Wisconsin.
152	Madras,† India	—05 20 59.14	+13 04 08.0	7	Madras Observatory.
153	Madrid, Spain	+00 14 45.09	+40 24 30.1	656	Astronomical Observatory.
154	Mandeville,* Jamaica ..	+05 10 02	+18 01	640	Observatory of W.H. Pickering.
155	Manila, Philippine Islands	—08 03 54.2	+14 34 41	8	Observatory of Weather Bureau.
156	Mare Island, California ..	+08 09 05.63	+38 05 55.8	18	U.S. Naval Observatory.
157	Marseille, France	—00 21 34.55	+43 18 16	75	National Obs., at Longchamp.
158	Mauritius (Port Louis) ..	—03 50 12.6	—20 05 39	55	Royal Alfred Observatory.
159	Melbourne,‡ Victoria ..	—09 39 54.2 c	—37 49 53.4	28	Government Observatory.
160	Merate (Como), Italy ..	—00 37 42.85 ^b	+45 41 54.1	380	Branch of Brera Obs., Milan.
161	Meudon, France	—00 08 55.5	+48 48 18	162	Obs. of Physical Astronomy.
162	Middletown, Connecticut ..	+04 50 38.2 a	+41 33 18	70	Van Vleck Obs., Wesleyan Univ.
163	Milan, Italy	—00 36 45.89 ^a	+45 27 59.2	120	Royal Observatory of Brera.
164	Minneapolis, Minnesota ..	+06 12 57.08	+44 58 40.0	262	Obs. of the Univ. of Minnesota.
165	Mizusawa, Japan	—09 24 31.46	+39 08 03.4	61	International Latitude Obs.
166	Montevideo, Uruguay ..	+03 44 51	—34 54 33	24	National Observatory.
167	Montezuma, Chile	+04 35 44	—22 38	3000	Solar Radiation Station.‡
168	Montreal, Canada	+04 54 18.63	+45 30 20	57	McGill University Observatory.
169	Moscow, Russia	—02 31 51.56	+55 45 46.7	130	Astrophysical Obs., at Kutchino.
170	Moscow, Russia	—02 30 17.00 ^a	+55 45 20.2	166	University Obs., at Presnia.
171	Mount Brukkaros, S.W. Afr.	—01 11 12	—25 52	1600	Solar Radiation Observatory.‡
172	Mount Hamilton, California	+08 06 34.96	+37 20 25.6	1283	Lick Obs., Univ. of California.
173	Mount Lowe, California ..	+07 52 29.5	+34 17 44.5	1067	Observatory on Echo Mountain.
174	Mount Lysina, Poland ..	—01 20 15.1	+49 46 05	912	Branch of Cracow Observatory.
175	Mount Wilson, California ..	+07 52 14.33	+34 12 59.5	1742	Obs. of Carnegie Institution.
176	Munich, Germany	—00 46 26.02	+48 08 45.5	529	Munich Observatory.
177	Münster, Germany	—00 30 29.66	+51 57 45.8	75	University Observatory.
178	Nantucket, Massachusetts	+04 40 25.17 ^a	+41 16 50.1	11	Maria Mitchell Observatory.
179	Naples, Italy	—00 57 02	+40 51 46	153	Royal Obs., Capo di Monte.
180	Nashville, Tennessee ..	+05 47 12.8	+36 08 58	174	Vanderbilt University Obs.

* See also List B. a Equatorial refractor. b Equatorial reflector. c Transit or meridian circle.

† The geodetic co-ordinates are —05° 20' 59".62 and +13° 04' 03".1.

‡ Transferred from Williamstown* in 1863.

§ Branch of Smithsonian Institution.

LIST A.—ACTIVE OBSERVATORIES.

No.	Natural Values of					Logarithms of				
	$\rho \sin \phi'$	$\rho \cos \phi'$	$\tan \phi'$	$\frac{8.80 \times}{15} \rho \cos \phi'$	$8.80 \times \rho \sin \phi'$	$\rho \sin \phi'$	$\rho \cos \phi'$	$\tan \phi'$	$\frac{8.80 \times}{15} \rho \cos \phi'$	$8.80 \times \rho \sin \phi'$
144	+0.76930	0.63577	+1.21003	0.373	+6.77	9.88610	9.80330	0.08279	9.572	0.831
145	+0.62198	0.78138	+0.79601	0.458	+5.47	9.79378	9.89286	9.90092	9.661	0.738
146	+0.79918	0.59751	+1.33751	0.351	+7.03	9.90264	9.77634	0.12630	9.545	0.847
147	-0.43521	0.89963	-0.48377	0.528	-3.83	9.63870 ⁿ	9.95406	9.68464 ⁿ	9.722	0.583 ⁿ
148	-0.53824	0.84164	-0.63951	0.494	-4.74	9.73097 ⁿ	9.92513	9.80585 ⁿ	9.694	0.675 ⁿ
149	+0.82241	0.56486	+1.45596	0.331	+7.24	9.91509	9.75194	0.16315	9.520	0.860
150	+0.71208	0.69972	+1.01766	0.411	+6.27	9.85253	9.84492	0.00760	9.613	0.797
151	+0.67949	0.73162	+0.92874	0.429	+5.98	9.83218	9.86429	9.96789	9.633	0.777
152	+0.22464	0.97427	+0.23057	0.572	+1.98	9.35149	9.98868	9.36281	9.757	0.296
153	+0.64485	0.76260	+0.84560	0.447	+5.67	9.80946	9.88230	9.92716	9.651	0.754
154	+0.30734	0.95137	+0.32306	0.558	+2.70	9.48763	9.97835	9.50928	9.747	0.432
155	+0.25006	0.96801	+0.25832	0.568	+2.20	9.39804	9.98588	9.41216	9.754	0.343
156	+0.61366	0.78796	+0.77880	0.462	+5.40	9.78793	9.89650	9.89142	9.665	0.732
157	+0.68235	0.72888	+0.93616	0.428	+6.00	9.83401	9.86266	9.97135	9.631	0.778
158	-0.34139	0.93951	-0.36337	0.551	-3.00	9.53325 ⁿ	9.97290	9.56035 ⁿ	9.741	0.478 ⁿ
159	-0.60999	0.79082	-0.77134	0.464	-5.37	9.78532 ⁿ	9.89808	9.88725 ⁿ	9.666	0.730 ⁿ
160	+0.71213	0.69968	+1.01779	0.410	+6.27	9.85256	9.84490	0.00766	9.613	0.797
161	+0.74886	0.65990	+1.13481	0.387	+6.59	9.87440	9.81948	0.05492	9.588	0.819
162	+0.65986	0.74944	+0.88048	0.440	+5.81	9.81945	9.87474	9.94472	9.643	0.764
163	+0.70927	0.70254	+1.00958	0.412	+6.24	9.85081	9.84667	0.00414	9.615	0.795
164	+0.70329	0.70860	+0.99251	0.416	+6.19	9.84714	9.85040	9.99673	9.619	0.792
165	+0.62774	0.77672	+0.80820	0.456	+5.52	9.79778	9.89026	9.90752	9.659	0.742
166	-0.56906	0.82097	-0.69316	0.482	-5.01	9.75516 ⁿ	9.91433	9.84083 ⁿ	9.683	0.700 ⁿ
167	-0.38261	0.92387	-0.41414	0.542	-3.37	9.58276 ⁿ	9.96561	9.61715 ⁿ	9.734	0.527 ⁿ
168	+0.70974	0.70205	+1.01096	0.412	+6.25	9.85110	9.84637	0.00474	9.615	0.796
169	+0.82305	0.56391	+1.45953	0.331	+7.24	9.91543	9.75121	0.16421	9.520	0.860
170	+0.82300	0.56404	+1.45913	0.331	+7.24	9.91540	9.75131	0.16409	9.520	0.860
171	-0.43373	0.90061	-0.48160	0.528	-3.82	9.63722 ⁿ	9.95454	9.68268 ⁿ	9.723	0.582 ⁿ
172	+0.60334	0.79619	+0.75778	0.467	+5.31	9.78056	9.90102	9.87955	9.669	0.725
173	+0.56037	0.82716	+0.67746	0.485	+4.93	9.74847	9.91759	9.83088	9.686	0.693
174	+0.75990	0.64724	+1.17406	0.380	+6.69	9.88076	9.81107	0.06969	9.579	0.825
175	+0.55929	0.82802	+0.67545	0.486	+4.92	9.74764	9.91804	9.82959	9.686	0.692
176	+0.74129	0.66854	+1.10882	0.392	+6.52	9.86999	9.82513	0.04486	9.594	0.814
177	+0.78396	0.61747	+1.26963	0.362	+6.90	9.89429	9.79062	0.10368	9.559	0.839
178	+0.65627	0.75259	+0.87202	0.442	+5.78	9.81709	9.87656	9.94053	9.645	0.762
179	+0.65080	0.75739	+0.85928	0.444	+5.73	9.81345	9.87932	9.93413	9.648	0.758
180	+0.58663	0.80845	+0.72562	0.474	+5.16	9.76836	9.90765	9.86071	9.676	0.713

OBSERVATORIES.

LIST A.—ACTIVE OBSERVATORIES.

No.	Place.	Longitude.	Latitude.	Altitude.	Description.
181	Neuchâtel, Switzerland ..	^h ^m ^s —00 27 49.57 ^a	+46 59 49.5	^m 488	Cantonal Observatory.
182	New Brunswick, New Jersey	+04 57 47.45	+40 30 01.4	21	Schanck Obs. of Rutgers Univ.
183	New Haven, Connecticut..	+04 51 40.58	+41 19 22.3	40	Yale University Observatory.
184	Newlands, South Africa ..	—01 13 55	—33 58 00	30	Observatory of W. Reid.†
185	New Plymouth, New Zealand	—11 36 17.70	—39 03 45.2	49	Obs. of New Plymouth Ast. Soc.
186	Nice, France	—00 29 12.1 c	+43 43 16.9	378	Nice Obs., on Mount Gros.
187	Nikolaieff (Ukraine), Russia	—02 07 53.98 ^c	+46 58 19.3	55	Astronomical Observatory.‡
188	Northampton, Mass. ..	+04 50 33.10	+42 19 01.9	61	Smith College Observatory.
189	Northfield, Minnesota ..	+06 12 35.94 ^a	+44 27 41.4	290	Goodsell Obs., Carleton College.
190	Oakland, California ..	+08 08 48	+37 47	99	Chabot Observatory.
191	Odessa, Russia	—02 03 02.15	+46 28 36.0	55	Astronomical Observatory.
192	Omaha, Nebraska	+06 23 46.96	+41 16 05.6	344	Creighton University Obs.
193	Ondrejov, Czechoslovakia ..	—00 59 08	+49 54 38	527	Observatory of J. and J. Frič.
194	Orono, Maine	+04 34 40.3	+44 54 00	40	Obs. of University of Maine.
195	Oslo, § Norway	—00 42 53.5 c	+59 54 43.7	25	University Observatory.
196	Ottawa, Canada	+05 02 51.94 ^c	+45 23 38.1	87	Dominion Observatory.
197	Oxford, England	+00 05 00.4	+51 45 34.2	64	University Observatory.
198	Oxford, England	+00 05 03.0 c	+51 45 35.6	65	Radcliffe Observatory.
199	Oxford, Mississippi	+05 58 07.18	+34 22 12.6	140	Obs. of Univ. of Mississippi.
200	Padua, Italy	—00 47 29.15	+45 24 01.2	38	Royal University Observatory.
201	Paisley, Scotland	+00 17 43.3	+55 50 43.8	33	Coats Observatory.
202	Palermo, Sicily	—00 53 25.87	+38 06 44.0	72	Royal Observatory.
203	Paris, France	—00 09 20.93||	+48 50 11	67	Observatory of Paris.
204	Paris, France	—00 09 22.0	+48 51 10.5	57	Obs. of the Astr. Soc. of France.
205	Peking, China	—07 45 52.87	+39 54 23.0	—	Central Observatory.
206	Pennant Hills, N.S.W. ..	—10 04 14.5	—33 44 31	188	Branch of Sydney Observatory.
207	Perth, Western Australia..	—07 43 21.62 ^a	—31 57 10.7	60	Government Observatory.
208	Philadelphia, Pennsylvania	+05 01 06.88 ^a	+39 58 02.1	74	Flower Observatory, University of Pennsylvania.
209	Philadelphia, Pennsylvania	+05 00 38.5	+39 57 07.5	—	Obs. of Central High School.
210	Pic du Midi, France ..	—00 00 34.29	+42 56 31.5	2850	Branch of Toulouse Univ. Obs.
211	Porto Alegre, Brazil ..	+03 24 53.24	—30 01 50	26	Astr. and Meteorological Inst
212	Posen, Poland	—01 07 30.60	+52 23 47.7	85	University Observatory.
213	Potsdam, Germany ..	—00 52 15.86	+52 22 56.0	97	Astrophysical Observatory.
214	Potsdam, Germany ..	—00 52 16.11	+52 22 54.8	99	Geodetic Institute.
215	Poughkeepsie, New York ..	+04 55 33.6 ^a	+41 41 18	61	Vassar College Observatory.
216	Prague, Czechoslovakia ..	—00 57 40.28	+50 05 15.8	197	National Observatory.
217	Prague, Czechoslovakia ..	—00 57 40.3	+50 05 16	200	Obs. of the German University

* See also List B. ^a Equatorial refractor. ^b Equatorial reflector. ^c Transit or meridian circle
† Mr. Reid died in 1928 while this list was in press.

‡ 1823–1912, Naval Observatory; 1912–1926, branch of Pulkovo Observatory.

§ Before 1925, Christiania. || Cassini's meridian.

LIST A.—ACTIVE OBSERVATORIES.

No.	Natural Values of					Logarithms of				
	$\rho \sin \phi'$	$\rho \cos \phi'$	$\tan \phi'$	$\frac{8.82 \times}{\rho \cos \phi'}$	$8.80 \times \rho \sin \phi'$	$\rho \sin \phi'$	$\rho \cos \phi'$	$\tan \phi'$	$\frac{8.82 \times}{\rho \cos \phi'}$	$8.80 \times \rho \sin \phi'$
181	+0.72777	0.68332	+1.06505	0.401	+6.40	9.86199	9.83462	0.02737	9.603	0.806
182	+0.64601	0.76148	+0.84835	0.447	+5.68	9.81024	9.88166	9.92858	9.650	0.755
183	+0.65683	0.75211	+0.87332	0.441	+5.78	9.81745	9.87628	9.94117	9.645	0.762
184	-0.55554	0.83024	-0.66913	0.487	-4.89	9.74472 ⁿ	9.91920	9.82551 ⁿ	9.688	0.689 ⁿ
185	-0.62677	0.77750	-0.80614	0.456	-5.52	9.79711 ⁿ	9.89070	9.90641 ⁿ	9.659	0.742 ⁿ
186	+0.68765	0.72392	+0.94991	0.425	+6.05	9.83737	9.85969	9.97768	9.628	0.782
187	+0.72742	0.68359	+1.06412	0.401	+6.40	9.86179	9.83480	0.02699	9.603	0.806
188	+0.66974	0.74057	+0.90436	0.434	+5.89	9.82590	9.86956	9.95634	9.638	0.770
189	+0.69690	0.71493	+0.97478	0.419	+6.13	9.84317	9.85427	9.98801	9.623	0.788
190	+0.60934	0.79134	+0.77000	0.464	+5.36	9.78486	9.89837	9.88649	9.667	0.729
191	+0.72150	0.68988	+1.04584	0.405	+6.35	9.85824	9.83877	0.01947	9.607	0.803
192	+0.65615	0.75277	+0.87164	0.442	+5.77	9.81700	9.87666	9.94034	9.645	0.761
193	+0.76146	0.64531	+1.18000	0.379	+6.70	9.88165	9.80977	0.07188	9.578	0.826
194	+0.70231	0.70953	+0.98982	0.416	+6.18	9.84653	9.85097	9.99555	9.619	0.791
195	+0.86162	0.50260	+1.71433	0.295	+7.58	9.93531	9.70122	0.23409	9.470	0.880
196	+0.70838	0.70344	+1.00703	0.413	+6.23	9.85027	9.84723	0.00304	9.616	0.795
197	+0.78177	0.62026	+1.26040	0.364	+6.88	9.89308	9.79257	0.10051	9.561	0.838
198	+0.78177	0.62026	+1.26039	0.364	+6.88	9.89308	9.79257	0.10051	9.561	0.838
199	+0.56136	0.82631	+0.67935	0.485	+4.94	9.74924	9.91714	9.83209	9.686	0.694
200	+0.70846	0.70335	+1.00726	0.413	+6.23	9.85031	9.84717	0.00314	9.616	0.795
201	+0.82387	0.56273	+1.46406	0.330	+7.25	9.91586	9.75030	0.16556	9.519	0.860
202	+0.61385	0.78782	+0.77917	0.462	+5.40	9.78806	9.89643	9.89163	9.665	0.733
203	+0.74921	0.65948	+1.13607	0.387	+6.59	9.87460	9.81920	0.05540	9.588	0.819
204	+0.74940	0.65926	+1.13673	0.387	+6.59	9.87471	9.81906	0.05566	9.587	0.819
205	+0.63811	0.76816	+0.83070	0.451	+5.62	9.80489	9.88545	9.91944	9.654	0.749
206	-0.55231	0.83244	-0.66348	0.488	-4.86	9.74218 ⁿ	9.92035	9.82183 ⁿ	9.689	0.687 ⁿ
207	-0.52617	0.84929	-0.61954	0.498	-4.63	9.72112 ⁿ	9.92906	9.79207 ⁿ	9.697	0.666 ⁿ
208	+0.63893	0.76749	+0.83249	0.450	+5.62	9.80545	9.88507	9.92038	9.653	0.750
209	+0.63872	0.76765	+0.83204	0.450	+5.62	9.80531	9.88516	9.92015	9.654	0.750
210	+0.67804	0.73351	+0.92437	0.430	+5.97	9.83126	9.86541	9.96585	9.634	0.776
211	-0.49752	0.86649	-0.57418	0.508	-4.38	9.69681 ⁿ	9.93776	9.75904 ⁿ	9.706	0.641 ⁿ
212	+0.78860	0.61149	+1.28964	0.359	+6.94	9.89686	9.78639	0.11047	9.555	0.841
213	+0.78845	0.61169	+1.28897	0.359	+6.94	9.89678	9.78653	0.11024	9.555	0.841
214	+0.78845	0.61170	+1.28895	0.359	+6.94	9.89677	9.78654	0.11024	9.555	0.841
215	+0.66160	0.74789	+0.88462	0.439	+5.82	9.82059	9.87384	9.94675	9.642	0.765
216	+0.76341	0.64291	+1.18743	0.377	+6.72	9.88276	9.80815	0.07461	9.577	0.827
217	+0.76341	0.64291	+1.18743	0.377	+6.72	9.88276	9.80815	0.07461	9.577	0.827

LIST A.—ACTIVE OBSERVATORIES.

No.	Place.	Longitude.	Latitude.	Altitude.	Description.
218	Prague-Smichov, Czecho-slovakia	—00 ^h 57 ^m 35 ^s .1	+50° 04' 36".0	267 ^m	Astronomical Institute of the Charles University.
219	Princeton, New Jersey ..	+04 58 39.44a	+40 20 55.8	75	Halsted Obs., Princeton Univ.
220	Princeton, New Jersey ..	+04 58 37.64a	+40 20 57.4	65	Obs. of Instruction, Princeton University.
221	Providence, Rhode Island	+04 45 35.95	+41 50 15.6	69	Ladd Obs., Brown University.
222	Providence, Rhode Island	+04 45 37.64	+41 49 46.4	171	Observatory of F. E. Seagrave
223	Pulkovo, Russia	—02 01 18.57	+59 46 18.5	75	Pulkovo Observatory.
224	Quebec, Canada	+04 44 52.71	+46 47 59.2	90	Quebec Obs., Plains of Abraham
225	Riga, Latvia	—01 36 28.1	+56 57 08	—	Obs. of the Latvian University
226	Rio de Janeiro, Brazil ..	+02 52 53.77a	—22 53 43.9	38	National Observatory.
227	Rochester, New York* ..	+05 10 28.13	+43 10 10.5	178	Observatory of Bausch and Lomb Optical Co.
228	Rome, Italy*	—00 49 56.34c	+41 53 33.2	65	Royal Observatory, at Capitol
229	Rome, Italy*	—00 49 48.21a	+41 54 12.6	100	Vatican Observatory.
230	Rugby, England	+00 05 02	+52 22 30	119	Temple Observatory.
231	San Fernando, Spain ..	+00 24 49.30	+36 27 42.0	30	Naval Observatory.
232	San Salvador, Salvador ..	+05 56 48	+13 42 00	682	National Observatory.
233	Santa Clara, California ..	+08 07 48	+37 20 45	30	Obs. of Univ. of Santa Clara.
234	Santiago, Chile*	+04 42 45.09c	—33 33 44.2	580	National Obs., at San Bernardo
235	Santiago, Chile	+04 42 36	—33 25 30	840	Southern Station of Lick Obs.
236	Selsey (Sussex), England ..	+00 03 12.4	+50 43 49	10	Observatory of A. E. Levin.
237	Sétif, Algeria	—00 21 38.6	+36 11 10	1120	Observatory of Jarry Desloges
238	Sidmouth, England ..	+00 12 52.5	+50 41 13.3	171	Norman Lockyer Observatory
239	Simefs (Crimea), Russia ..	—02 15 58	+44 24 11	360	Branch of Pulkovo Observatory.
240	Singapore, Malay Peninsula	—06 55 17.40	+ 1 16 08.8	74	Mount Faber Observatory.
241	Sonneberg, Germany ..	—00 44 46.19	+50 22 41.4	640	Sonneberg Observatory.
242	South Hadley, Mass. ..	+04 50 19	+42 15 18.2	76	Williston Obs., Mt. Holyoke Col
243	South Kensington (London), England.	+00 00 42.4	+51 29 50	11	Imperial College Observatory.
244	Springfield, Illinois ..	+05 58 34.2	+39 48 58.6	183	Obs. of Illinois Watch Co.
245	Springfield, Vermont ..	+04 45 56	+43 18	168	Observatory of J. Hartness.
246	Stará Dala, † Czechoslovakia	—01 12 45.5	+47 52 27.3	113	Astrophysical Observatory. §
247	Stockholm, Sweden ..	—01 12 13.97c	+59 20 32.7	44	Stockholm Observatory.
248	Stonyhurst, England ..	+00 09 52.88a	+53 50 38.5	117	Stonyhurst College Observatory.
249	Strasbourg, France ..	—00 31 04.25a	+48 35 02.0	156	Strasbourg Observatory.
250	Sutton (Surrey), England	+00 00 44.53	+51 22 19.8	51	Observatory of W. Doberck.
251	Swarthmore, Pennsylvania	+05 01 25.62	+39 54 16.2	—	Sproul Obs., Swarthmore Colleg
252	Sydney, New South Wales	—10 04 49.54	—33 51 41.1	44	Government Observatory.
253	Syracuse, New York ..	+05 04 33.36	+43 02 13.1	160	Holden Obs., Syracuse Univ.
254	Syracuse, New York ..	+05 04 34.31	+43 00 48.8	137	Roe Observatory.
255	Table Mountain, California	+07 50 44	+34 23	2286	Solar Radiation Station. ||
256	Tacubaya, D.F., Mexico ..	+06 36 46.74	+19 24 17.9	2311	National Observatory.
257	Tananarive, Madagascar ..	—03 10 12.45	—18 55 02.1	1381	Tananarive Observatory.
258	Tartu (Dorpat), Estonia ..	—01 46 53.19	+58 22 47.2	67	University Observatory.
259	Tashkent (Turkestan), Russia	—04 37 10.57a	+41 19 36.7	479	Tashkent Observatory.
260	Teramo, Italy	—00 54 55.8	+42 39 27	398	Cerulli Obs., at Collurania.

* See also List B. a Equatorial refractor. b Equatorial reflector. c Transit or meridian circle.

† On Cerro San Cristobal. ‡ Name changed from O-Gyalla in 1918, when annexed from Hungary.

§ Formerly private observatory of von Konkoly. || Branch of Smithsonian Institution.

OBSERVATORIES.

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LIST A.—ACTIVE OBSERVATORIES.

No.	Natural Values of					Logarithms of				
	$\rho \sin \phi'$	$\rho \cos \phi'$	$\tan \phi'$	$\frac{8.80 \times}{\rho \cos \phi'}$	$\frac{8.80 \times}{\rho \sin \phi'}$	$\rho \sin \phi'$	$\rho \cos \phi'$	$\tan \phi'$	$\frac{8.80 \times}{\rho \cos \phi'}$	$\frac{8.80 \times}{\rho \sin \phi'}$
218	+0.76329	0.64306	+1.18696	0.377	+6.72	9.88269	9.80825	0.07444	9.577	0.827
219	+0.64400	0.76320	+0.84382	0.448	+5.67	9.80889	9.88264	9.92625	9.651	0.753
220	+0.64401	0.76320	+0.84383	0.448	+5.67	9.80889	9.88264	9.92626	9.651	0.753
221	+0.66354	0.74616	+0.88927	0.438	+5.84	9.82187	9.87283	9.94903	9.641	0.766
222	+0.66344	0.74627	+0.88902	0.438	+5.84	9.82180	9.87290	9.94891	9.641	0.766
223	+0.86039	0.50472	+1.70469	0.296	+7.57	9.93470	9.70305	0.23165	9.471	0.879
224	+0.72537	0.68579	+1.05772	0.402	+6.38	9.86056	9.83619	0.02437	9.605	0.805
225	+0.83455	0.54663	+1.52672	0.321	+7.34	9.92145	9.73769	0.18376	9.506	0.866
226	-0.38664	0.92169	-0.41949	0.541	-3.40	9.58730 ⁿ	9.96459	9.62272 ⁿ	9.733	0.532 ⁿ
227	+0.68065	0.73050	+0.93176	0.429	+5.99	9.83292	9.86362	9.96930	9.632	0.777
228	+0.66425	0.74552	+0.89098	0.437	+5.85	9.82233	9.87246	9.94987	9.641	0.767
229	+0.66440	0.74540	+0.89133	0.437	+5.85	9.82243	9.87239	9.95004	9.641	0.767
230	+0.78838	0.61179	+1.28863	0.359	+6.94	9.89673	9.78660	0.11013	9.555	0.841
231	+0.59099	0.80521	+0.73396	0.472	+5.20	9.77158	9.90591	9.86567	9.674	0.716
232	+0.23532	0.97184	+0.24214	0.570	+2.07	9.37165	9.98759	9.38406	9.756	0.316
233	+0.60330	0.79598	+0.75793	0.467	+5.31	9.78053	9.90090	9.87963	9.669	0.725
234	-0.54974	0.83422	-0.65899	0.489	-4.84	9.74016 ⁿ	9.92128	9.81888 ⁿ	9.690	0.685 ⁿ
235	-0.54777	0.83557	-0.65557	0.490	-4.82	9.73860 ⁿ	9.92198	9.81662 ⁿ	9.690	0.683 ⁿ
236	+0.77052	0.63425	+1.21485	0.372	+6.79	9.88679	9.80226	0.08453	9.571	0.832
237	+0.58723	0.80819	+0.72660	0.474	+5.17	9.76881	9.90751	9.86130	9.676	0.713
238	+0.77007	0.63485	+1.21299	0.372	+6.78	9.88653	9.80267	0.08386	9.571	0.831
239	+0.69618	0.71565	+0.97279	0.420	+6.13	9.84272	9.85470	9.98802	9.623	0.787
240	+0.02200	0.99977	-0.02200	0.587	-0.19	8.34241	9.99990	8.34251	9.768	9.287
241	+0.76670	0.63906	+1.19974	0.375	+6.75	9.88463	9.80554	0.07909	9.574	0.829
242	+0.66894	0.74130	+0.90239	0.435	+5.89	9.82539	9.86999	9.95539	9.638	0.770
243	+0.77892	0.62384	+1.24860	0.366	+6.85	9.89149	9.79507	0.09642	9.563	0.836
244	+0.63692	0.76918	+0.82805	0.451	+5.60	9.80408	9.88603	9.91805	9.654	0.749
245	+0.68231	0.72895	+0.93602	0.428	+6.00	9.83398	9.86270	9.97128	9.631	0.778
246	+0.73807	0.67202	+1.09829	0.394	+6.49	9.86810	9.82738	0.04072	9.596	0.813
247	+0.85659	0.51118	+1.67569	0.300	+7.54	9.93277	9.70858	0.22419	9.477	0.877
248	+0.80376	0.59129	+1.35933	0.347	+7.07	9.90513	9.77180	0.13333	9.540	0.850
249	+0.74631	0.66279	+1.12601	0.389	+6.57	9.87292	9.82138	0.05154	9.590	0.817
250	+0.77757	0.62555	+1.24302	0.367	+6.84	9.89074	9.79626	0.09448	9.565	0.835
251	+0.63808	0.76818	+0.83064	0.451	+5.62	9.80488	9.88546	9.91941	9.654	0.749
252	-0.55402	0.83126	-0.66648	0.488	-4.88	9.74353 ⁿ	9.91974	9.82379 ⁿ	9.688	0.688 ⁿ
253	+0.67896	0.73208	+0.92745	0.429	+5.97	9.83185	9.86456	9.96729	9.633	0.776
254	+0.67866	0.73235	+0.92669	0.430	+5.97	9.83165	9.86472	9.96693	9.633	0.776
255	+0.56174	0.82646	+0.67969	0.485	+4.94	9.74953	9.91722	9.83231	9.686	0.694
256	+0.33025	0.94389	+0.34989	0.554	+2.91	9.51885	9.97492	9.54393	9.743	0.463
257	-0.32221	0.94653	-0.34041	0.555	-2.84	9.50813 ⁿ	9.97613	9.53200 ⁿ	9.745	0.453 ⁿ
258	+0.84790	0.52557	+1.61327	0.308	+7.46	9.92834	9.72063	0.20771	9.489	0.873
259	+0.65693	0.75211	+0.87344	0.441	+5.78	9.81752	9.87628	9.94123	9.645	0.762
260	+0.67414	0.73660	+0.91521	0.432	+5.93	9.82875	9.86723	9.96152	9.636	0.773

OBSERVATORIES.

LIST A.—ACTIVE OBSERVATORIES.

No.	Place.	Longitude.	Latitude.	Altitude.	Description.
261	Tokyo, Japan	^h ^m ^s —09 18 10.09	[°] ['] ["] +35 40 21.4	^m 59	Tokyo Astronomical Observatory, at Mitaka-mura.
262	Toronto, Canada	+05 17 34.70	+43 39 46.0	110	University Observatory.
263	Toronto, Canada	+05 17 34.67	+43 40 01.3	116	Meteorological Observatory.
264	Tortosa, Spain	—00 01 58	+40 49 14	54	Ebro Observatory.
265	Toulouse, France	—00 05 51.2 c	+43 36 44.0	195	University Observatory.
266	Tow Law, England	+00 07 14.46b	+54 43 30	305	Wolsingham Obs. of T.E. Espin
267	Trieste, Italy	—00 55 04.89	+45 38 35.5	67	Royal Astronomical Obs.
268	Trivandrum, India	—05 07 59	+ 8 30 32	61	Obs. of Maharaja of Travancore
269	Tsingtao, China	—08 01 16.9	+36 04 11	78	Astronomical Observatory
270	Tucson, Arizona	+07 23 47.68b	+32 13 59.4	757	Steward Obs., Univ. of Arizona
271	Turin, Italy	—00 31 05.95	+45 02 16.3	618	Royal Obs., at Pino Torinese
272	Uccle (Brussels*), Belgium	—00 17 26.05	+50 47 54.6	105	Royal Observatory.
273	Ukiah, California	+08 12 50.3	+39 08 12.0	220	International Latitude Obs.
274	Uppsala,† Sweden	—01 10 30.17a	+59 51 29.4	21	University Astronomical Obs.
275	Urbana, Illinois	+05 52 53.90a	+40 06 20.2	236	Obs. of University of Illinois.
276	Utrecht, Holland	—00 20 31.01a	+52 05 09.6	14	Zonnenburg Observatory.
277	Valkenburg (Limburg), Holland	—00 23 19.91	+50 52 29.3	100	Observatory of Ignatius Colleg
278	Venice, Italy	—00 49 18.2 b	+45 25 48.9	25	Obs. of Patriarchal Seminar
279	Victoria, British Columbia	+08 13 40.17	+48 31 15.7	229	Dominion Astrophysical Obs.
280	Vienna, Austria	—01 05 21.35	+48 13 55.3	240	University Observatory.
281	Vienna, Austria	—01 05 29.76	+48 11 58.3	200	Obs. of Technical High School
282	Vienna, Austria	—01 05 26.24	+48 12 40.5	211	Military Geographical Institut
283	Wanganui, New Zealand ..	—11 40 21 a	—39 57 10	23	Wanganui Observatory.
284	Warsaw, Poland	—01 24 10	+52 04 12	—	Observatory of Free Poli
285	Warsaw, Poland	—01 24 07.25	+52 13 04.6	121	University, at Piaseczno.
286	Washington, D.C.	+05 08 15.75c	+38 55 12.3	85	U.S. Naval Observatory.
287	Washington, D.C.	+05 08 18.3 a	+38 54 26.0	62	Georgetown College Obs.
288	Washington, D.C.	+05 08 06.24	+38 53 17.3	10	Smithsonian Astrophysical O
289	Wellesley, Massachusetts ..	+04 45 12.7	+42 17 34.8	61	Whitin Obs., Wellesley Colle
290	Wellington,* New Zealand	—11 39 04.27c	—41 17 03.8	127	Dominion Observatory.†
291	West Norwood (London), England	+00 00 23.10	+51 26 09.9	38	Obs. of W. H. Steavenson.
292	West Point, New York	+04 55 50.6	+41 23 22.1	146	U.S. Military Academy.
293	Wilhelmshaven, Germany ..	—00 32 35.15	+53 31 52.1	9	Naval Observatory.
294	Williams Bay, Wisconsin ..	+05 54 13.24a	+42 34 12.6	334	Yerkes Obs., Univ. of Chica
295	Williamstown, Massachusetts	+04 52 50	+42 42 30	213	Field Memorial Obs., Willia College.
296	Wilno,* Poland	—01 41 01.0 a	+54 41 00	133	University Observatory.
297	Woltersdorf, Germany	—00 46 50.94	+50 47 20.0	279	Obs. of Duke of Saxe-Altenbu
298	Worthing, England	+00 01 33.3	+50 48 50	11	Obs. of A. M. Newbegin.‡
299	Zô-Sê, China	—08 04 44.82a	+31 05 48.0	100	Jesuit Obs., near Shanghai.
300	Zurich, Switzerland	—00 34 12.30a	+47 22 37.6	469	Observatory of Swiss P ^h technic School.

* See also List B. a Equatorial refractor. b Equatorial reflector. c Transit or meridian circle.
 † The modern spelling is Uppsala, but the above form is retained in astronomical usage.

‡ Formerly (1907–1925) Hector Observatory.

§ Transferred from Sutton* in 1927.

LIST A.—ACTIVE OBSERVATORIES.

No.	Natural Values of					Logarithms of				
	$\rho \sin \phi'$	$\rho \cos \phi'$	$\tan \phi'$	$\frac{2.303}{\rho \cos \phi'}$	$8.80 \times \rho \sin \phi'$	$\rho \sin \phi'$	$\rho \cos \phi'$	$\tan \phi'$	$\frac{2.303}{\rho \cos \phi'}$	$8.80 \times \rho \sin \phi'$
261	+0.57990	0.81330	+0.71302	0.477	+5.10	9.76335	9.91025	9.85310	9.679	0.708
262	+0.68688	0.72459	+0.94796	0.425	+6.04	9.83688	9.86009	9.97679	9.628	0.781
263	+0.68694	0.72454	+0.94810	0.425	+6.05	9.83692	9.86006	9.97686	9.628	0.781
264	+0.65024	0.75786	+0.85800	0.445	+5.72	9.81307	9.87959	9.93349	9.648	0.758
265	+0.68626	0.72521	+0.94629	0.425	+6.04	9.83649	9.86046	9.97602	9.629	0.781
266	+0.81276	0.57883	+1.40416	0.340	+7.15	9.90996	9.76255	0.14741	9.531	0.854
267	+0.71142	0.70034	+1.01583	0.411	+6.26	9.85213	9.84531	0.00682	9.614	0.797
268	+0.14698	0.98908	+0.14860	0.580	+1.29	9.16726	9.99523	9.17203	9.764	0.112
269	+0.58550	0.80925	+0.72351	0.475	+5.15	9.76753	9.90809	9.85944	9.676	0.712
270	+0.53035	0.84680	+0.62630	0.497	+4.67	9.72456	9.92778	9.79678	9.696	0.669
271	+0.70407	0.70790	+0.99459	0.415	+6.20	9.84762	9.84997	9.99764	9.618	0.792
272	+0.77129	0.63334	+1.21781	0.372	+6.79	9.88722	9.80164	0.08558	9.570	0.832
273	+0.62779	0.77671	+0.80827	0.456	+5.52	9.79782	9.89026	9.90756	9.659	0.742
274	+0.86114	0.50341	+1.71061	0.295	+7.58	9.93307	9.70192	0.23315	9.470	0.880
275	+0.64079	0.76596	+0.83658	0.449	+5.64	9.80671	9.88420	9.92251	9.653	0.751
276	+0.78528	0.61577	+1.27528	0.361	+6.91	9.89502	9.78942	0.10560	9.558	0.840
277	+0.77213	0.63231	+1.22113	0.371	+6.79	9.88769	9.80093	0.08676	9.569	0.832
278	+0.70882	0.70298	+1.00831	0.412	+6.24	9.85054	9.84694	0.00359	9.615	0.795
279	+0.74560	0.66362	+1.12353	0.389	+6.56	9.87250	9.82192	0.05058	9.590	0.817
280	+0.74225	0.66739	+1.11217	0.392	+6.53	9.87055	9.82438	0.04617	9.593	0.815
281	+0.74187	0.66781	+1.11090	0.392	+6.53	9.87033	9.82465	0.04568	9.593	0.815
282	+0.74201	0.66766	+1.11136	0.392	+6.53	9.87041	9.82455	0.04585	9.593	0.815
283	-0.63873	0.76764	-0.83206	0.450	-5.62	9.80532	9.88516	9.92016	9.654	0.750
284	+0.78510	0.61599	+1.27454	0.361	+6.91	9.89493	9.78957	0.10535	9.558	0.839
285	+0.78670	0.61396	+1.28135	0.360	+6.92	9.89581	9.78814	0.10767	9.557	0.840
286	+0.62485	0.77907	+0.80205	0.457	+5.50	9.79578	9.89158	9.90420	9.660	0.740
287	+0.62467	0.77921	+0.80168	0.457	+5.50	9.79565	9.89165	9.90400	9.660	0.740
288	+0.62441	0.77941	+0.80113	0.457	+5.49	9.79547	9.89176	9.90371	9.660	0.740
289	+0.66942	0.74085	+0.90359	0.435	+5.89	9.82570	9.86973	9.95597	9.638	0.770
290	-0.65634	0.75256	-0.87214	0.442	-5.78	9.81713	9.87634	9.94058	9.645	0.762
291	+0.77826	0.62468	+1.24587	0.366	+6.85	9.89113	9.79566	0.09547	9.564	0.836
292	+0.65771	0.75135	+0.87537	0.441	+5.79	9.81804	9.87585	9.94219	9.644	0.763
293	+0.80052	0.59568	+1.34386	0.349	+7.04	9.90337	9.77502	0.12836	9.543	0.848
294	+0.67302	0.73762	+0.91241	0.433	+5.92	9.82803	9.86783	9.96019	9.636	0.773
295	+0.67477	0.73598	+0.91684	0.432	+5.94	9.82916	9.86687	9.96229	9.635	0.774
296	+0.81232	0.57941	+1.40199	0.340	+7.15	9.90973	9.76298	0.14675	9.531	0.854
297	+0.77120	0.63349	+1.21740	0.372	+6.79	9.88717	9.80174	0.08543	9.570	0.832
298	+0.77145	0.63312	+1.21848	0.371	+6.79	9.88731	9.80149	0.08582	9.570	0.832
299	+0.51348	0.85708	+0.59910	0.503	+4.52	9.71052	9.93302	9.77750	9.701	0.655
300	+0.73227	0.67846	+1.07932	0.398	+6.44	9.86467	9.83152	0.03315	9.600	0.809

OBSERVATORIES.LIST B.—FORMER OBSERVATORIES.

Place.	Longitude.	Latitude.	Altitude.	Period of Activity.	Description.
Åbo, Finland	^h ^m ^s -01 29 06.3	[°] ['] ["] +60 26 57	^m —	1819-1837	Former site of Helsingfors Obs.
Albany,* New York ..	+04 55 00.0	+42 39 49	52	1856-1893	Former site of Dudley Obs.
Allegheny,* Pennsylvania	+05 20 02.9	+40 27 42	370	1861-1905	Former site of Observatory of University of Pittsburgh.
Altona, Germany	-00 39 46.2	+53 32 45	31	1825-1873	Former site of Kiel* Obs.
Amherst,* Massachusetts ..	+04 50 04.7	+42 22 17	—	1829-1903	Lawrence Observatory.
Arequipa, Peru	+04 46 11.7	-16 22 28	2451	1891-1927	Boyden Station of Harvard College Observatory.†
Ascension ("Mars Bay")	+00 57 39	- 7 59 15	—	1877	Obs. of the late Sir D. Gill.
Bayswater, W. Australia ..	-07 43 38.8	-31 55 14	—	1906-1909	International Latitude Obs.
Bedford, England	+00 01 51.9	+52 08 28	—	1830-1839	Observatory of the late Admiral W. H. Smyth.
Berlin,* Germany	-00 53 34.4	+52 31 13	—	1700-1835	Original site of Royal Obs.
Berlin,* Germany	-00 53 34.8	+52 30 17	47	1835-1913	Former site of Royal Obs.
Birr Castle (Parsonstown), Ireland.	+00 31 40.9	+53 05 47	56	1840-1867	Obs. of the 3rd Earl of Rosse.
Blackheath (London), Eng.	-00 00 00.6	+51 28 03	—	1806-1827	Obs. of the late S. Groombridge.
Boston,* Massachusetts ..	+04 44 15.0	+42 21 32	48	1890-1908	Former site of Boston Univ. Obs.
Botzkamp, Germany	-00 40 31.2	+54 12 10	32	1870-	Observatory of von Bülow.
Bremen, Germany	-00 35 15.9	+53 04 36	—	-1840	Obs. of the late H. Olbers.
Breslau,* Germany	-01 08 08.7	+51 06 56	147	1791-1921	Former site of University Obs.
Brisbane,* Queensland ..	-10 12 06.4	-27 28 00	—	1884-1922	Former site of Brisbane Obs.
Brussels, Belgium	-00 17 28.0	+50 51 11	—	1834-1891	Former site of Royal Obs.†
Chapultepec, Mexico ..	+06 36 43.0	+19 25 17	—	1876-1883	Former site of National Obs.
Chicago, Illinois	+05 50 26.7	+41 50 01	175	1863-1887	Dearborn Observatory.§
Chuquicamata, Chile ..	+04 45 27	-22 16 36	2886	1923-1926	Branch of Harvard College Obs.
Cincinnati,* Ohio	+05 37 59.0	+39 06 26	247	1843-1873	Former site of Cincinnati Obs.
Clinton, New York	+05 01 37.5	+43 03 16	276	1852-1918	Litchfield Obs., Hamilton Coll.
Copenhagen,* Denmark ..	-00 50 18.7	+55 40 52	14	1637-1861	Former site of University Obs.
Crowborough, England ..	-00 00 37.3	+51 03 07	238	1890-1904	Obs. of the late Isaac Roberts.
Daramona, Ireland	+00 29 59	+53 41 12	84	1871-1908	Obs. of the late W. E. Wilson.
Dresden, Germany	-00 54 54.6	+51 02 19	124	1877-1897	Former site of Engelhardt Obs.||
Dun Echt, Scotland	+00 09 40	+57 09 36	141	1872-1894	Obs. of the late Earl of Crawford.
Durban,* South Africa ..	-02 04 01.2	-29 50 47	79	1882-1912	Obs. of the Government of Natal.
Edinburgh,* Scotland ..	+00 12 43.6	+55 57 23	106	1776-1895	Former site of Royal Obs.¶
Florence, Italy	-00 45 01.5	+43 46 04	—	1650-1872	Former site of Royal Obs.**
Gaithersburg, Maryland ..	+05 08 47.7	+39 08 13	165	1899-1916	International Latitude Obs.
Gohlis, Germany	-00 49 29.5	+51 21 35	108	1875-1887	Obs. of the late Dr. Winkler.††
Gotha,* Germany	-00 42 55.1	+50 56 04	360	1788-1857	Former site of Ducal Obs., at Seeburg.
Haddenham, England ..	+00 03 43.4	+51 45 54	—	1857-1868	Obs. of the late W. R. Dawes.
Halifax, England	+00 07 28	+53 42 09	—	1872-1905	Obs. of the late Edward Crossley.
Hamburg, Germany	-00 39 53.6	+53 33 06	25	1821-1909	Former site of Hamburg Obs.§§

* See also List A.

† Transferred to Bloemfontein* in 1927.

‡ Now at Uccle.

§ Transferred to Evanston, Illinois, in 1887.

|| Transferred to Kasan* in 1897.

¶ Site of City Obs. on Calton Hill, 1898-1926.

** Transferred to Arcetri* in 1872.

†† See also Jena.

§§ Transferred to Bergedorf* in 1909.

OBSERVATORIES.

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LIST B.—FORMER OBSERVATORIES.

Place.	Longitude.	Latitude.	Altitude.	Period of Activity.	Description.
Harrow, England ..	^{h m s} +00 01 19.9	^{° ' "} +51 34 47	^m 60	1882-1922	Obs. of the late Col. Tupman.
Hartwell, England ..	+00 03 24.3	+51 48 36	—	1831-1866	Obs. of the late Dr. J. Lee.
Hastings on Hudson, N.Y.	+04 55 29.7	+40 59 25	69	1860-1882	Obs. of the late Henry Draper.
Heidelberg,* Germany ..	-00 34 46.8	+49 24 34	126	1879-1898	Former site of Dr. Max Wolf's Observatory.
Herény, Hungary ..	-01 06 24.6	+47 15 47	229	1881-1909	Obs. of the late E. Gothard.
Ipswich, England ..	-00 04 55.8	+52 00 33	—	1874-1889	Obs. of the late Col. Tomline, at Orwell Park.
Ithaca,* New York ..	+05 05 56.5	+42 26 51	—	1889-1902	Former Obs. of Cornell Univ.
Ithaca,* New York ..	+05 05 56.0	+42 26 47	256	1902-1915	Former site of Fuertes Obs. of Cornell University.
Jena,* Germany ..	-00 46 20.7	+50 56 16	174	1892-1910	Obs. of the late Dr. Winkler.†
Jena,* Germany ..	-00 46 20.3	+50 55 36	155	1812-1888	Former site of University Obs.
Karlsruhe, Germany ..	-00 33 35.4	+49 00 30	110	1880-1896	Former site of Baden Obs.†
Kempshot, Jamaica ..	+05 11 29.5	+18 24 51	540	1872-1920	Obs. of the late Maxwell Hall.
Kensington (London), Eng.	+00 00 46.8	+51 30 12	—	1826-1831	Obs. of the late Sir J. South.
Kensington (London), Eng.	+00 00 49.4	+51 30 03	17	1886-1924	Obs. of the late W. H. Maw.§
Kew (Surrey), England ..	+00 01 15	+51 28 06	6	1769-1840	Kew Observatory.||
Leiden,* Holland ..	-00 17 56.6	+52 09 28	—	1632-1860	Former site of University Obs.
Leipzig,* Germany ..	-00 49 29.9	+51 20 20	155	1791-1861	Former site of University Obs.
Leyton, England ..	+00 00 00.9	+51 34 34	—	1854-1886	Obs. of the late J. G. Barclay.
Liverpool,* England ..	+00 12 00.1	+53 24 48	—	1843-1867	Former site of Liverpool Obs.
Liverpool, England ..	+00 11 38.7	+53 25 28	—	1840-1875	Obs. of the late W. Lassell.
Lussinpiccolo,¶ Italy ..	-00 57 52.3	+44 32 11	42	1893-1910	Manora Observatory.
Mandeville,* Jamaica ..	+05 10 02	+18 01 00	640	1912-1926	Branch of Harvard College Obs.
Mannheim, Germany ..	-00 33 50.4	+49 29 11	98	1775-1880	Former site of Heidelberg* Observatory.**
Markree, Ireland ..	+00 33 48.4	+54 10 32	45	1824-1902	Obs. of the late E. J. and Col. Cooper.
Marseille,* France ..	-00 21 28.1	+43 17 52	29	1702-1864	Former site of National Obs., at Accoules.
Mervel Hill (Surrey), Eng-land.	+00 02 30.2	+51 08 12	128	1903-1910	Obs. of the late J. Franklin-Adams.
Mundenheim, Germany ..	-00 33 44	+49 27 30	100	1907-1913	Observatory of Dr. M. Mündler.
New Haven,* Connecticut	+04 51 42.2	+41 18 36	—	1830-1882	Former site of Yale Univ. Obs.
New York, New York ..	+04 55 56.7	+40 43 48	—	1850-1892	Obs. of the late L. M. Rutherford.
New York, New York ..	+04 55 53.6	+40 45 23	—	1883-1897	Former site of Columbia Univ. Observatory.
Oncativo, Argentina ..	+04 14 44.8	-31 55 10	280	1906-1908	International Latitude Obs.
Outwood (Surrey), England	+00 00 23.7	+51 11 38	119	1896-1924	Obs. of the late W. H. Maw.
Paramatta (Sydney), N.S.W.	-10 04 00.2	-33 48 50	—	1827-1855	Obs. of the late Sir T. Brisbane.
Plonsk, Poland ..	-01 21 31.9	+52 37 40	—	1873-1898	Former site of Jedrzejewicz Observatory.††
Redhill (Surrey), England	+00 00 41.2	+51 14 25	—	1853-1870	Obs. of the late R. C. Carrington.

* See also List A. † See also Gohlis. ‡ Transferred from Mannheim in 1880; transferred to Heidelberg* in 1896. § See also Outwood. || Now a Physical Observatory. ¶ Formerly in Austria.
 ** Transferred to Karlsruhe in 1880. †† Transferred to Warsaw in 1898.

OBSERVATORIES.

LIST B.—FORMER OBSERVATORIES.

Place.	Longitude.	Latitude.	Altitude.	Period of Activity.	Description.
Regents Park (London), Eng.	+00 00 37.1 ^{h m s}	+51 31 30 ^{° ′ ″}	— ^m	1836-1861	Obs. of the late G. Bishop.
Rochester, New York ..	+05 10 21.9	+43 09 17	172	1882-1894	Warner Obs., built for Lev Swift.
Rochester,* New York ..	+05 10 29.6	+43 10 37	150	1912-1920	Former site of Obs. of Baus and Lomb Optical Co.
Rome,* Italy ..	-00 49 48.3	+41 54 12	100	-1907	Former site of Vatican Obs.†
Rome,* Italy ..	-00 49 55.1	+41 53 54	51	1776-1924	Royal Obs., at Roman Colle
Rousdon (Devon), England	+00 11 58.9	+50 42 38	157	1884-1922	Obs. of the late Sir C. Peek.
San Francisco, California..	+08 09 42.9	+37 47 28	382	1878-1911	Obs. of the late G. Davidson
San Luis, Argentina ..	+04 25 22	-33 17 46	800	1909-1911	Southern Obs. of Carnegie Institution of Washington.
Santiago,* Chile ..	+04 42 36.8	-33 26 25	619	1852-1862	Former site of National Obs., Santa Lucia.
Santiago,* Chile ..	+04 42 46.3	-33 26 42	519	1862-1910	Former site of National Obs., Quinta Normal.
Slough, England ..	+00 02 24	+51 30 20	—	1783-1839	Obs. of the late Sir Jc Herschel.
Sonneberg,* Germany ..	-00 44 42.9	+50 21 30	405	1920-1926	Former site of Sonneberg O
Southport, England ..	+00 11 56.5	+53 39 25	12	1877-1887	Obs. of the late J. Baxendel
St. Helena ..	+00 22 54.6	-15 55 26	213	1829-1833	Obs. of Hon. East India Co.
Sunderland, England ..	+00 05 31.1	+54 53 48	49	1858-1920	Obs. of the late T.W. Backhor
Sutton (Surrey), England	+00 00 44	+51 21 26	70	1904-1927	Obs. of A. M. Newbegin.§
Taunton, Massachusetts ..	+04 44 20	+41 54 00	8	1905-1910	Obs. of the late J. H. Metcal
Thames, New Zealand ..	-11 42 10.6	-37 08 23	8	1884-1920	Obs. of the late J. Grigg.
Tokyo,* Japan ..	-09 18 58.7	+35 39 16	25	1888-1924	Former site of Tokyo Obs., Azabu.
Tschardjui (Turkestan), Russia.	-04 13 57.3	+39 08 11	167	1899-1909	Former site of Internatic Latitude Observatory.
Tschardjui (Turkestan), Russia.	-04 14 17.2	+39 08 11	188	1909-1918	International Latitude Obser
Tübingen, Germany ..	-00 36 15.4	+48 31 22	398	1911-1926	The Oesterberg Observatory
Tulse Hill (London), Eng.	+00 00 27.7	+51 26 47	48	1866-1910	Obs. of the late Sir W. Hugg
Turin,* Italy ..	-00 30 47.1	+45 04 08	276	1791-1913	Former site of Royal Univ. C
Uranibourg,¶ Sweden ..	-00 50 47.7	+55 54 25	45	1576-1597	Observatory of Tycho Brah
Utrecht,* Holland..	-00 20 28.9	+52 05 13	23	1642-1854	Former site of Zonnenburg C
Vienna, Austria ..	-01 05 11.1	+48 12 47	—	1884-1914	Obs. of von Kuffner.
Vienna, Austria ..	-01 05 25.3	+48 12 53	—	1863-1886	Obs. of von Oppolzer.
Vienna,* Austria ..	-01 05 31.6	+48 12 35	193	1753-1879	Former site of University C
Warsaw, Poland ..	-01 24 04.8	+52 13 10	110	1898-1926	Jedrzejewicz Observatory.*
Washington,* D.C. ..	+05 08 12.1	+38 53 39	31	1842-1893	Former site of U.S. Naval C
Wellington,* New Zealand	-11 39 05.1	-41 16 47	—	1869-1907	Colonial Time Service Obs.
Williamstown, Victoria ..	-09 39 38.1	-37 52 07	—	1853-1863	Former site of Govt. Obs.†
Wilno,* Poland ..	-01 41 08.8	+54 40 59	—	1753-1876	Former site of University C
Winchester, Massachusetts	+04 44 32.4	+42 27 11	30	1911-1920	Obs. of the late J. H. Metcal
Windsor, N.S.W. ..	-10 03 19.9	-33 36 31	16	1863-1916	Obs. of the late J. Tebbutt
Zacatecas, Mexico ..	+06 50 12.2	+22 46 35	2610	1904-1924	Obs. of District Governme

* See also List A. † Founded by Pope Gregory XIII. ‡ Observations made by Manuel J. John
 § Transferred to Worthing* in 1927. || Transferred to Winchester in 1911. ¶ Formerly in Denmark
 ** Formerly at Plonsk. †† Transferred to Melbourne* in 1863. §§ Formerly at Taunton

LIST C.—INDEX LIST.

Actual names of Observatories are in bold type.

Names of owners of private Observatories are in italics.

NAME, ETC.	PLACE.	LIST.	NAME, ETC.	PLACE.	LIST.
Ann Arbor (Branch)	Bloemfontein	A	Columbia University	New York	B
Arizona, Univ. of	Tucson	A	Commonwealth	Canberra	A
Azabu	Tokyo	B	<i>Cooper</i>	Markree	B
			Cornell University	Ithaca	*
Babelsberg	Berlin	A	Cracow (Branch)	Mt. Lysina	A
<i>Backhouse</i>	Sunderland	B	<i>Crawford, Earl of</i>	Dun Echt	B
Baden	Heidelberg	A	Creighton University	Omaha	A
Baldwin-Wallace Coll.	Berea	A	<i>Crossley</i>	Halifax	B
<i>Barclay</i>	Leyton	B			
Bausch and Lomb	Rochester	A	Dartmouth College	Hanover	A
<i>Baxendell</i>	Southport	B	<i>Davidson</i>	San Francisco	B
<i>Bennett</i>	Leiston	A	<i>Dawes</i>	Haddenham	B
Bidston	Liverpool	A	Dearborn	Chicago	B
<i>Bishop</i>	Regents Park	B	Dearborn	Evanston	A
Boscha	Lembang	A	De Pauw University	Greencastle	A
Bouzaréah	Algiers	A	<i>Desloges</i>	Sétif	A
Boyden Station of } Harvard Coll. Obs. }	Bloemfontein	A	Detroit	Ann Arbor	A
	Arequipa	B	<i>Doberck</i>	Sutton	A
Brackett	Claremont	A	Dominion	Ottawa	A
<i>Brahé</i>	Uranibourg	B	Dominion	Wellington	A
Brera	Milan	A	Dominion	Victoria, B.C.	A
Brera (Branch)	Merate	A	Astrophysical		
<i>Brisbane</i>	Paramatta†	B	Dorpat	Tartu	A
Brown University	Providence	A	Drake University	Des Moines	A
Brussels	Uccle	A	<i>Draper</i>	Hastings on	B
<i>Bülow von</i>	Bothkamp	B		Hudson	
			Dudley	Albany	*
			Dunsink	Dublin	A
Cajigal	Caracas	A			
California, Univ. of	Berkeley	A	<i>East India Co.</i>	St. Helena	B
California, Univ. of	Mt. Hamilton	A	Ebro	Tortosa	A
Calton Hill	Edinburgh	B	Echo Mountain	Mount Lowe	A
Campos Rodrigues	Lourenço	A	Engelhardt	Dresden	B
	Marques		Engelhardt	Kasan	A
Capo di Monte	Naples	A	<i>Espin</i>	Tow Law	A
Carleton College	Northfield	A	<i>Evershed</i>	Ewhurst	A
Carnegie Institution	Mount Wilson	A			
Carnegie Institution	San Luis	B	Fabra	Barcelona	A
<i>Carrington</i>	Redhill	B	<i>Fauth</i>	Landstuhl	A
Cartuja	Granada	A	Field Memorial	Williamstown	A
Case	Cleveland	A	<i>Flammarion</i>	Juvisy	A
Central College	Fayette	A	Floirac	Bordeaux	A
<i>Cerulli</i>	Teramo	A	Florence	Arcetri	A
Chabot	Oakland	A	Flower	Philadelphia	A
Chamberlin	Denver	A	<i>Franklin-Adams</i>	Mervel Hill	B
Charkow	Kharkov	A	<i>Frič</i>	Ondřejov	A
Charles University	Prague	A	Fuertes	Ithaca	*
Charlottenburg	Berlin	A			
Chicago, Univ. of	Williams Bay	A	Georgetown College	Washington	A
Christiania	Oslo	A	<i>Gill</i>	Ascension	B
Coats	Paisley	A	Goodsell	Northfield	A
Cointe	Liège	A	<i>Gothard</i>	Herény	B
Colaba	Bombay	A	<i>Grigg</i>	Thames	B
Collurania	Teramo	A	<i>Groombridge</i>	Blackheath	B

* In both A and B Lists.

† Now spelt Parramatta.

OBSERVATORIES.

LIST C.—INDEX LIST.

Actual names of Observatories are in bold type.
Names of owners of private Observatories are in italics.

NAME, ETC.	PLACE.	LIST.	NAME, ETC.	PLACE.	LIST.
Haig	Dehra Dün ..	A	Lick	Mt. Hamilton	A
<i>Hall</i>	Kempshot ..	B	Lick (Branch) ..	Santiago ..	A
Halsted	Princeton ..	A	Lille, Univ. of ..	Hem ..	A
Hamburg	Bergedorf ..	A	Litchfield	Clinton ..	B
Hamilton College ..	Clinton ..	B	Lockyer, Norman ..	Sidmouth ..	A
<i>Hargreaves</i>	Kingswood ..	A	Lowell	Flagstaff ..	A
<i>Hartness</i>	Springfield ..	A	Lwów	Lemberg ..	A
Harvard	Cambridge ..	A			
Harvard (Branch) ..	Arequipa ..	B	Maharaja of Travan-	Trivandrum	A
Harvard (Branch) ..	Bloemfontein	A	core		
Harvard (Branch) ..	Chuquicamata	B	<i>Manora</i>	Lussinpiccolo	B
Harvard (Branch) ..	Mandeville ..	B	Maria Mitchell ..	Nantucket ..	A
Haynald	Kalocsa ..	A	Mars, Bay	Ascension ..	B
Hector	Wellington ..	A	<i>Maw</i>	Kensington ..	B
Hendaye	Abbadia ..	A	<i>Maw</i>	Outwood ..	B
<i>Herschel</i>	Slough ..	B	Mazelspoort ..	Bloemfontein	A
Holden	Syracuse ..	A	McCormick, Leander	Charlottesville	A
<i>Huggins</i>	Tulse Hill ..	B	McGill University ..	Montreal ..	A
			McKim	Greencastle ..	A
Ignatius College ..	Valkenburg ..	A	McMillin	Columbus ..	A
Illinois, Univ. of ..	Urbana ..	A	<i>Metcalf</i>	Taunton ..	B
Illinois Watch Co. ..	Springfield ..	A	<i>Metcalf</i>	Winchester ..	B
Imperial College ..	South Ken-	A	Michigan, Univ. of ..	Ann Arbor ..	A
	sington		Michigan (Branch) ..	Bloemfontein	A
Indiana, Univ. of ..	Bloomington	A	Milan (Branch) ..	Merate ..	A
International Lat. ..	Bayswater ..	B	<i>Milicević</i>	Blaca ..	A
International Lat. ..	Carloforte ..	A	Minnesota, Univ. of	Minneapolis	A
International Lat. ..	Gaithersburg	B	Mississippi, Univ. of	Oxford ..	A
International Lat. ..	Mizusawa ..	A	Missouri, Univ. of ..	Columbia ..	A
International Lat. ..	Oncativo ..	B	Mitaka-mura ..	Tokyo ..	A
International Lat. ..	Tschardjui ..	B	Morrison	Fayette ..	A
International Lat. ..	Ukiah ..	A	Mount Faber ..	Singapore ..	A
			Mount Holyoke Coll.	South Hadley	A
<i>Jedrzejewicz</i>	Plonsk ..	B	Mount Stromlo ..	Canberra ..	A
<i>Jedrzejewicz</i>	Warsaw ..	B	<i>Miindler</i>	Mundenheim	B
Jurjew	Tartu ..	A			
			Natal	Durban ..	*
Kapteyn Laboratory	Groningen ..	A	<i>Newbegin</i>	Worthing ..	A
Kirkwood	Bloomington	A	<i>Newbegin</i>	Sutton ..	B
Königstuhl	Heidelberg ..	A	Nizamiah	Hyderabad ..	A
<i>Konkoly, von</i>	Stará Dala ..	A	Northwestern Univ.	Evanston ..	A
<i>Kuffner, von</i>	Vienna ..	B			
Kutchino	Moscow ..	A	Oesterberg	Tübingen ..	B
			Ó-Gyalla	Stará Dala ..	A
Ladd	Providence ..	A	Olbers	Bremen ..	B
Lamont Expedition	Bloemfontein	A	Ole Römer	Aarhus ..	A
<i>Lassell</i>	Liverpool ..	B	<i>Oppolzer, von</i>	Vienna ..	B
Lawrence	Amherst ..	B	Orwell Park ..	Ipswich ..	B
Lawrence College ..	Appleton ..	A	Otago Institute ..	Dunedin ..	A
Laws	Columbia ..	A			
<i>Lee</i>	Hartwell ..	B	Parsonstown ..	Birr Castle ..	B
Lehigh University ..	Bethlehem ..	A	<i>Peek</i>	Herne ..	A
<i>Leiner</i>	Konstanz ..	A	<i>Peek</i>	Rousdon ..	B
<i>Levin</i>	Selsey ..	A	Pennsylvania, Univ. of	Philadelphia	A

* In both A and B Lists.

OBSERVATORIES.

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LIST C.—INDEX LIST.

Actual names of Observatories are in bold type.
Names of owners of private Observatories are in italics.

NAME, ETC.	PLACE.	LIST.	NAME, ETC.	PLACE.	LIST.
Perkins	Delaware ..	A	<i>Stevenson</i>	West ..	A
<i>Phillips</i>	Headley ..	A		Norwood ..	
Piaseczno	Warsaw ..	A	Steward	Tucson ..	A
<i>Pickering</i>	Mandeville ..	A	Svábhegy	Budapest ..	A
Pino Torinese ..	Turin ..	A	<i>Swift</i>	Rochester ..	B
Pittsburgh, Univ. of	Allegheny ..	A	Sydney (Branch) ..	Pennant Hills ..	A
Pomona College ..	Claremont ..	A			
Poznań	Posen ..	A	Tapada	Lisbon ..	A
Presnia	Moscow ..	A	<i>Tebbutt</i>	Windsor ..	B
Pulkovo (Branch) ..	Simeis ..	A	Temple	Rugby ..	A
Pulkovo (Branch) ..	Nikolaieff ..	A	<i>Tomline</i>	Ipswich ..	B
			Toulouse (Branch) ..	Pic du Midi ..	A
Radeliffe	Oxford ..	A	Transvaal	Johannesburg ..	A
<i>Reid</i>	Newlands ..	A	Travancore	Trivandrum ..	A
Remels	Bamberg ..	A	Treptow	Berlin ..	A
<i>Roberts</i>	Crowborough ..	B	<i>Tupman</i>	Harrow ..	B
<i>Roberts</i>	Lovedale ..	A			
<i>Roe</i>	Syracuse ..	A	Underwood	Appleton ..	A
Römer, Ole	Aarhus ..	A	Union	Johannesburg ..	A
<i>Rosse, Earl of</i> ..	Birr Castle ..	B	Urania	Berlin ..	A
Royal Alfred	Mauritius ..	A	Urania	Copenhagen ..	A
Rutgers University	New ..	A			
	Brunswick ..		Vanderbilt Univ. ..	Nashville ..	A
<i>Rutherford</i>	New York ..	B	Vassar College ..	Poughkeepsie ..	A
			Vatican	Rome ..	A
Saad-Naïl	Ksara ..	A	Virginia, Univ. of ..	Charlottes- ville ..	A
Samoa	Apia ..	A	Vleck, van	Middletown ..	A
San Calixto, Coll. of	La Paz ..	A			
Saxe-Alienbourg,	Wolfersdorf ..	A	Warner	Rochester ..	B
<i>Duke of</i>			Warner and Swasey	Cleveland ..	A
<i>Saxton</i>	Frome ..	A	Washburn	Madison ..	A
Sayre	Bethlehem ..	A	Wesleyan University	Delaware ..	A
S. Bartolome	Bogota ..	A	Wesleyan University	Middletown ..	A
Schanek Observatory	New ..	A	Western Reserve	Hudson ..	A
	Brunswick ..		Academy		
Seagrave	Providence ..	A	Whitin	Wellesley ..	A
Seeborg	Gotha ..	B	Williams College ..	Williamstown ..	A
Shanghai	Zô-Sè ..	A	Williston	South Hadley ..	A
Shattuck	Hanover ..	A	<i>Wilson</i>	Daramona ..	B
Smith	Beloit ..	A	<i>Winkler</i>	Gohlis ..	B
Smith	Berea ..	A	<i>Winkler</i>	Jena ..	B
Smith	Geneva ..	A	Wisconsin, Univ. of	Madison ..	A
Smith College	Northampton ..	A	<i>Wolf</i>	Heidelberg ..	B
Smithsonian Inst. ..	Washington ..	A	Wolsingham	Tow Law ..	A
	Montezuma ..	A			
Smithsonian Inst.	Mt. Brukkaros ..	A	Yalden	Leonia ..	A
(Branches) {	Table ..	A	Yale	New Haven ..	A
	Mountain ..		Yale (Branch)	Johannesburg ..	A
<i>Smyth</i>	Bedford ..	B	Yerkes	Williams Bay ..	A
South	Kensington ..	B			
Sproul	Swarthmore ..	A	Zonnenburg	Utrecht ..	A

h m s	
-12 20	Tonga or Friendly Islands.
-12	Wrangell Island, and North and South Coasts of Siberia to long. 172° 30' W., Fiji Islands.
-11 30	New Zealand, Chatham Islands.
-11 12	Norfolk Island.
-11	North Coast of Siberia, and Kamchatka to long. 172° 30' E., Caroline Islands east of long. 154° E., New Caledonia, New Hebrides, Santa Cruz, Nauru and Marshall Islands.
-10	North and South Coasts of Siberia to long. 157° 30' E., Tasmania, Victoria, New South Wales (except Broken Hill Area), Queensland, Lord Howe Island, British New Guinea, Caroline Islands west of long. 154° E. (except Palau and Yap), Marianas or Ladrões Islands, Guam Island.
-09 30	South Australia, Broken Hill Area (N.S.W.), Northern Territory (Australia).
-09	North Coast of Siberia and East Coast of Manchuria to long. 142° 30' E., Japan, Korea, Palau and Yap (Caroline Islands).
-08 33	Amboina.
-08 30	Ternate.
-08 20	Balik Papan.
-08	North Coast of Siberia to long. 127° 30' E., China (all the Coast except Hainan Island and Pakhoi) including Wuchau on the West River and Ichang on the Yangtze Kiang, Hong Kong, Macao, Ryojun Ko (Port Arthur), Formosa, Pescadores Islands, Labuan, Philippine Islands. British North Borneo, Timor, Western Australia.
-07 57 37	Macassar.
-07 30	Sarawak.
-07 20	Java, Muntok.
-07 17	Pontianak.
-07	North Coast of Siberia to long. 112° 30' E., Hainan Island and Pakhoi (China), French Indo-China, Siam, Straits Settlements, Federated Malay States.
-06 42	Emma Harbour.
-06 30	Burma, Cocos Islands, Nicobar Islands.
-06 10	Andaman Islands.
-06	North Coast of Siberia to long. 97° 30' E.
-05 53 20.8	Calcutta.
-05 30	India (except Calcutta), Portuguese India, Ceylon, Laccadive Islands.
-05	North Coast of Siberia to long. 82° 30' E., Chagos Archipelago.
-04 54	Maldiv Islands.
-04	Novaya Zemlya and North Coast of Siberia as far east as long. 67° 30' E., Mauritius, Réunion, Seychelles, Amirante Islands.
-03	North Coast of Russia from long. 40° E. to 52° 30' E., Iraq, Eritrea, French and Italian Somaliland, Kenya Colony and Protectorate, Tanganyika Territory, Madagascar, Comoro Islands, Socotra.
-02 59 54	Aden, British Somaliland.
-02 30	Uganda.
-02	(East European)—Finland, Estonia (except Revel), Latvia, European Russia, North Coast of Russia, and North Coast of Black Sea to long. 40° E., Romania, Bulgaria, Turkey, Greece, Cyprus, Palestine, Syria, Egypt, Sudan, Portuguese East Africa, Nyasaland, Rhodesia, Union of South Africa.
-01 38 57	Revel.
-01	(Mid-European)—Norway, Sweden, Denmark, Lithuania, Germany, Luxembourg, Poland, Czechoslovakia, Austria, Hungary, Switzerland, Yugoslavia, Albania, Italy, Sardinia, Sicily, Malta, Tunisia, Libya, Nigeria, Cameroons, French Equatorial Africa, Belgian Congo, Portuguese West Africa (Angola).
-00 19 32.1	Holland.

^h 00	^m 00	^s 00	
			(Greenwich)—The Faeroes, Great Britain and Northern Ireland,* Irish Free State,* Channel Islands,* Belgium, France, Spain, Portugal, Gibraltar, Balearic Islands, Corsica, Algeria, Morocco, Ivory Coast, Gold Coast Colony,† Togoland, Dahomey, Principe, São Thomé, Spanish Guinea, Fernando Po.
+00	23		St. Helena.
+01			Iceland, Madeira, Canary Islands, Mauritania, Rio de Oro, Senegal, Portuguese and French Guinea, Sierra Leone, Liberia, Ascension Island.
+01	06		Gambia.
+02			Azores, Cape Verde Islands, Fernando Noronha and Trinidad Islands (S. Atlantic).
+03			Eastern Brazil (including all the Coast).
+03	30		Uruguay.
+03	31		Labrador, Newfoundland.
+03	40	35	Dutch Guiana.
+03	45		British Guiana.
+03	51		South Georgia.
+03	51	25	Falkland Islands.
+04			(Atlantic)—Canada (east of 68th meridian), Nova Scotia, Prince Edward Island, St. Pierre and Miquelon, Porto Rico, Leeward Islands, Guadeloupe, Martinique, St. Vincent, Barbados, Grenada, Tobago, St. Lucia, Trinidad, French Guiana, Central Brazil, Argentina.
+04	19		Bermuda.
+04	30		Venezuela.
+04	36		Curaçao Island.
+04	56	52.4	Colombia.
+05			(Eastern)—Canada from 68th to 89th meridian, Eastern States of U.S.A. (Connecticut, Delaware, Florida, Georgia,‡ Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, North Carolina, Pennsylvania, Rhode Island, South Carolina, Vermont, Virginia, West Virginia), Washington, D.C., Bahamas, Cuba, Haiti, Dominican Republic, Jamaica, Panama Canal Zone, Chile,§ Peru, Western Brazil.
+05	14	06.7	Ecuador (except Guayaquil).
+05	19	24	Guayaquil.
+05	45	10	Nicaragua.
+06			(Central)—Canada from 89th to 103rd meridian, Central States of U.S.A. (Alabama,|| Arkansas, Illinois, Iowa, Indiana, Kansas,‡ Kentucky, Louisiana, Michigan, Minnesota, Mississippi, Missouri, Nebraska,‡ North Dakota,‡ Ohio,‡ Oklahoma, South Dakota,‡ Tennessee, Texas, Wisconsin), Mexico (Quintana Roo, Yucatan, Campeche, Tabasco, Vera Cruz, Oaxaca and Chiapas), British Honduras, Honduras, Salvador, Costa Rica.
+07			(Mountain)—Canada from 103rd meridian to boundary of British Columbia, Mountain States of U.S.A. (Arizona, Colorado, Idaho,‡ Montana,‡ New Mexico, Utah,‡ Wyoming), Mexico (Southern district of Lower California, Sonora, Sinaloa, Tepic, Jalisco, Colima, Michoacan, Guerrero, Tamaulipas).
+08			(Pacific)—Sitka, British Columbia, California, Nevada, Oregon, Washington, Mexico (Northern District of Lower California).
+09			Yukon, Cordova, Juneau, Ketchikan.
+10			Alaska (except certain ports), Marquesas Islands, Tuamotu or Low Archipelago, Society and Austral Islands.
+10	30		Hawaiian (formerly Sandwich) Islands.
+10	38		Cook Islands (including Rarotonga).
+11			Alutian Islands, West Coast of Alaska, Eastern Samoa (U.S.A.).
+11	30		Western Samoa (British).

*—01^h from the day following the third Saturday in April, or if that day is Easter Day, from the day following the second Saturday in April, to the day following the first Saturday in October.

† Jan. 1–Aug. 31 only; —00^h 20^m for rest of year.

‡ This applies to the greater portion of the State.

|| +03^h 30^m from Oct. 1 to Feb. 14 (approx.).

§ +04^h from Sept. 1 to March 31.

COUNTRY.	TIME.	COUNTRY.	TIME.
	^h ^m ^s		^h ^m ^s
Aden .. ..	.. -02 59 54	Canada (from 89th to 103rd Meridian) .. ..	.. +06
Alabama, U.S.A.* ..	.. +06	Canada (from 103rd Meridian to boundary of British Columbia) .. ..	.. +07
Alaska† .. ..	.. +10	Canary Islands .. ..	.. +01
Alaska, West Coast ..	.. +11	Cape Verde Islands .. ..	.. +02
Albania .. ..	.. -01	Caroline Islands (E. of Long. 154° E.) .. ..	.. -11
Aleutian Islands .. ..	.. +11	Caroline Islands (W. of Long. 154° E. except Palau and Yap) .. ..	.. -10
Algeria .. ..	.. 00	Ceylon .. ..	.. -05 30
Amboina .. ..	.. -08 33	Chagos Archipelago .. ..	.. -05
Amirante Islands .. ..	.. -04	Channel Islands§ .. ..	.. 00
Andaman Islands .. ..	.. -06 10	Chatham Islands .. ..	.. -11 30
Angola .. ..	.. -01	Chiapas (Mexico) .. ..	.. +06
Argentina .. ..	.. +04	Chile|| .. ..	.. +05
Arizona, U.S.A. .. ..	.. +07	China¶ .. ..	.. -08
Arkansas, U.S.A. .. ..	.. +06	Cocos Islands .. ..	.. -06 30
Ascension Island .. ..	.. +01	Colima (Mexico) .. ..	.. +07
Austral Islands .. ..	.. +10	Colombia .. ..	.. +04 56 52·4
Austria .. ..	.. -01	Colorado, U.S.A. .. ..	.. +07
Azores .. ..	.. +02	Comoro Islands .. ..	.. -03
		Connecticut, U.S.A. .. ..	.. +05
Bahamas .. ..	.. +05	Cook Islands (Rarotonga, etc.) ..	.. +10 38
Balearic Islands .. ..	.. 00	Cordova (Alaska) .. ..	.. +09
Balik Papan .. ..	.. -08 20	Corsica .. ..	.. 00
Barbados .. ..	.. +04	Costa Rica .. ..	.. +06
Belgian Congo .. ..	.. -01	Cuba .. ..	.. +05
Belgium .. ..	.. 00	Curaçao Island .. ..	.. +04 36
Bermuda .. ..	.. +04 19	Cyprus .. ..	.. -02
Black Sea, North Coast, (to Long. 40° E.) .. ..	.. -02	Czechoslovakia .. ..	.. -01
Brazil (Central) .. ..	.. +04		
Brazil (Eastern)† .. ..	.. +03	Dahomey .. ..	.. 00
Brazil (Western) .. ..	.. +05	Delaware, U.S.A. .. ..	.. +05
British Columbia .. ..	.. +08	Denmark .. ..	.. -01
British Guiana .. ..	.. +03 45	Dominican Republic .. ..	.. +05
British New Guinea .. ..	.. -10	Dutch Guiana .. ..	.. +03 40 35
British North Borneo .. ..	.. -08		
British Somaliland .. ..	.. -02 59 54	Ecuador (except Guayaquil) ..	.. +05 14 06·7
Broken Hill Area (N.S.W.) ..	.. -09 30	Egypt .. ..	.. -02
Bulgaria .. ..	.. -02	Emma Harbour .. ..	.. -06 42
Burma .. ..	.. -06 30	Eritrea .. ..	.. -03
		Estonia (except Revel) .. ..	.. -02
Calcutta .. ..	.. -05 53 20·8		
California, U.S.A. .. ..	.. +08	Faeroes, The .. ..	.. 00
Cameroons .. ..	.. -01	Falkland Islands .. ..	.. +03 51 25
Campeche (Mexico) .. ..	.. +06		
Canada (E. of 68th Meridian) ..	.. +04		
Canada (from 68th to 89th Meridian) .. ..	.. +05		

* +05h 30m from October 1 to February 14 (approximately).

† Except certain ports.

‡ Including all the Coast.

§ See previous list for Summer Time.

|| +04h from September 1 to March 31.

¶ All the coast (except Hainan Island and Pakhoi), and also Wuchau on the West River and Ichang on the Yangtze Kiang.

COUNTRY.	TIME.	COUNTRY.	TIME.
	^h ^m ^s		^h ^m ^s
Federated Malay States ..	-07	Jalisco (Mexico) ..	+07
Fernando Noronha Island ..	+02	Jamaica ..	+05
Fernando Po ..	00	Japan ..	-09
Fiji Islands ..	-12	Java ..	-07 20
Finland ..	-02	Juneau ..	+09
Florida, U.S.A. ..	+05		
Formosa ..	-08	Kamchatka ..	-11
France ..	00	Kansas, U.S.A.* ..	+06
French Equatorial Africa ..	-01	Kentucky, U.S.A. ..	+06
French Guiana ..	+04	Kenya ..	-03
French Guinea ..	+01	Ketchikan ..	+09
French Indo-China ..	-07	Korea ..	-09
French Somaliland ..	-03		
Friendly Islands ..	-12 20	Labrador ..	+03 31
		Labuan ..	-08
Gambia ..	+01 06	Laccadive Islands ..	-05 30
Georgia, U.S.A.* ..	+05	Ladrones Islands ..	-10
Germany ..	-01	Latvia ..	-02
Gibraltar ..	00	Leeward Islands ..	+04
Gold Coast Colony† ..	00	Liberia ..	+01
Great Britain‡ ..	00	Libya ..	-01
Greece ..	-02	Lithuania ..	-01
Grenada ..	+04	Lord Howe Island ..	-10
Guadeloupe ..	+04	Louisiana, U.S.A. ..	+06
Guam Island ..	-10	Low Archipelago ..	+10
Guayaquil ..	+05 19 24	Lower California (Northern District) ..	+08
Guerrero (Mexico) ..	+07	Lower California (Southern District) ..	+07
		Luxembourg ..	-01
Hainan Island (China) ..	-07		
Haiti ..	+05	Macao ..	-08
Hawaiian (formerly Sandwich) Islands ..	+10 30	Macassar ..	-07 57 37
Holland ..	-00 19 32 1	Madagascar ..	-03
Honduras ..	+06	Madeira ..	+01
Honduras, British ..	+06	Maine, U.S.A. ..	+05
Hong Kong ..	-08	Maldiv Islands ..	-04 54
Hungary ..	-01	Malta ..	-01
		Manchuria, East Coast ..	-09
Iceland ..	+01	Marianas Islands ..	-10
Idaho, U.S.A.* ..	+07	Marquesas Islands ..	+10
Illinois, U.S.A. ..	+06	Marshall Islands ..	-11
India (except Calcutta) ..	-05 30	Martinique ..	+04
Indiana, U.S.A. ..	+06	Maryland, U.S.A. ..	+05
Iowa, U.S.A. ..	+06	Massachusetts, U.S.A. ..	+05
Iraq ..	-03	Mauritania ..	+01
Ireland, Northern‡ ..	00	Mauritius ..	-04
Irish Free State‡ ..	00	Michigan, U.S.A. ..	+06
Italian Somaliland ..	-03	Michoacan (Mexico) ..	+07
Italy ..	-01	Minnesota, U.S.A. ..	+06
Ivory Coast ..	00		

* This applies to the greater portion of the State.

† For January 1 to August 31 only: -00h 20m for rest of year.

‡ See previous list for Summer Time.

COUNTRY.	TIME.	COUNTRY.	TIME.
	^h ^m ^s		^h ^m ^s
Miquelon .. ..	.. +04	Portuguese East Africa ..	.. -02
Mississippi, U.S.A. ..	.. +06	Portuguese Guinea ..	.. +01
Missouri, U.S.A. ..	.. +06	Portuguese India ..	.. -05 30
Montana, U.S.A.* ..	.. +07	Portuguese West Africa ..	.. -01
Morocco .. ..	.. 00	Prince Edward Island ..	.. +04
Muntok .. ..	.. -07 20	Principe .. ..	.. 00
Nauru Island .. ..	.. -11	Queensland .. ..	.. -10
Nebraska, U.S.A.* ..	.. +06	Quintana Roo (Mexico) ..	.. +06
Nevada, U.S.A. ..	.. +08	Rarotonga Island .. ..	.. +10 38
New Caledonia .. ..	.. -11	Réunion .. ..	.. -04
New Hampshire, U.S.A. ..	.. +05	Revel .. ..	.. -01 38 57
New Hebrides .. ..	.. -11	Rhode Island, U.S.A. ..	.. +05
New Jersey, U.S.A. ..	.. +05	Rhodesia .. ..	.. -02
New Mexico, U.S.A. ..	.. +07	Rio de Oro .. ..	.. +01
New South Wales† ..	.. -10	Romania .. ..	.. -02
New York, U.S.A. ..	.. +05	Russia, European .. ..	.. -02
New Zealand .. ..	.. -11 30	Russia (North Coast to Long.	
Newfoundland .. ..	.. +03 31	40° E.) .. ..	.. -02
Nicaragua .. ..	.. +05 45 10	Russia (North Coast from	
Nicobar Islands .. ..	.. -06 30	Long. 40° E. to 52° 30' E.)	-03
Nigeria .. ..	.. -01	Ryojun Ko (Port Arthur) ..	-08
Norfolk Island .. ..	.. -11 12	St. Helena .. ..	.. +00 23
North Carolina, U.S.A. ..	.. +05	St. Lucia .. ..	.. +04
North Dakota, U.S.A.* ..	.. +06	St. Pierre .. ..	.. +04
Northern Territory (Aust.) ..	-09 30	St. Vincent .. ..	.. +04
Norway .. ..	.. -01	Salvador .. ..	.. +06
Nova Scotia .. ..	.. +04	Samoa, Eastern (U.S.A.) ..	.. +11
Novaya Zemlya .. ..	.. -04	Samoa, Western (British) ..	+11 30
Nyasaland .. ..	.. -02	Sandwich Islands—See Hawaiian Islands	
Oaxaca (Mexico) .. ..	.. +06	Santa Cruz Islands .. ..	.. -11
Ohio, U.S.A.* .. ..	.. +06	São Thomé .. ..	.. 00
Oklahoma, U.S.A. ..	.. +06	Sarawak .. ..	.. -07 30
Oregon, U.S.A. .. ..	.. +08	Sardinia .. ..	.. -01
Pakhoi (China) .. ..	.. -07	Senegal .. ..	.. +01
Palau (Caroline Islands) ..	.. -09	Seychelles .. ..	.. -04
Palestine .. ..	.. -02	Siam .. ..	.. -07
Panama Canal Zone ..	.. +05	Siberia (North Coast to Long.	
Pennsylvania, U.S.A. ..	.. +05	67° 30' E.) .. ..	.. -04
Peru .. ..	.. +05	Siberia (North Coast to Long.	
Pescadores Islands ..	.. -08	82° 30' E.) .. ..	.. -05
Philippine Islands ..	.. -08	Siberia (North Coast to Long.	
Poland .. ..	.. -01	97° 30' E.) .. ..	.. -06
Pontianak .. ..	.. -07 17	Siberia (North Coast to Long.	
Port Arthur (Ryojun Ko) ..	-08	112° 30' E.) .. ..	.. -07
Porto Rico .. ..	.. +04	Siberia (North Coast to Long.	
Portugal .. ..	.. 00	127° 30' E.) .. ..	.. -08

* This applies to the greater portion of the State.

† Except Broken Hill Area.

COUNTRY.	TIME.	COUNTRY.	TIME.
	^h ^m ^s		^h ^m ^s
Siberia (North Coast to Long. 142° 30' E.)	-09	Ternate	-08 30
Siberia (North and South Coasts to Long. 157° 30' E.) ..	-10	Texas, U.S.A.	+06
Siberia (North Coast to Long. 172° 30' E.)	-11	Timor	-08
Siberia (North and South Coasts to Long. 172° 30' W.) ..	-12	Tobago	+04
Sicily	-01	Togoland	00
Sierra Leone	+01	Tonga Islands	-12 20
Sinaloa (Mexico)	+07	Trinidad	+04
Sitka	+08	Trinidad Island	+02
Society Islands	+10	Tuamotu Archipelago	+10
Socotra	-03	Tunisia	-01
Somaliland, British	-02 59 54	Turkey	-02
Somaliland, French	-03	Uganda	-02 30
Somaliland, Italian	-03	Union of South Africa	-02
Sonora (Mexico)	+07	Uruguay	+03 30
South Australia	-09 30	Utah, U.S.A.*	+07
South Carolina, U.S.A.	+05	Venezuela	+04 30
South Dakota, U.S.A.*	+06	Vera Cruz (Mexico)	+06
South Georgia	+03 51	Vermont, U.S.A.	+05
Spain	00	Victoria (Australia)	-10
Spanish Guinea	00	Virginia, U.S.A.	+05
Straits Settlements	-07	Washington, D.C., U.S.A.	+05
Sudan	-02	Washington, U.S.A.	+08
Sweden	-01	West Virginia, U.S.A.	+05
Switzerland	-01	Western Australia	-08
Syria	-02	Wisconsin, U.S.A.	+06
Tabasco (Mexico)	+06	Wrangell Island	-12
Tamaulipas (Mexico)	+07	Wyoming, U.S.A.	+07
Tanganyika Territory	-03	Yap (Caroline Islands)	-09
Tasmania	-10	Yucatan (Mexico)	+06
Tennessee, U.S.A.	+06	Yugoslavia	-01
Tepic (Mexico)	+07	Yukon	+09

* This applies to the greater portion of the State.

DATE OR CALENDAR LINE.

The Date or Calendar line is a modification of the line of the 180th meridian, which is drawn so as to include islands of any one group, etc., on the same side of the line.

It may be traced by joining up the following positions:—

Lat. 60° 00' S.	Long. 180° 00'
„ 51 30 S.	„ 180 00
„ 45 30 S.	„ 172 30 W.
„ 15 30 S.	„ 172 30 W.
„ 5 00 S.	„ 180 00
„ 48 00 N.	„ 180 00
„ 52 30 N.	„ 170 00 E.
„ 65 00 N.	„ 169 00 W.
„ 70 00 N.	„ 180 00

When crossing this line on a westerly course, the date must be advanced one day; when crossing it on an easterly course, the date must be put back one day.

TABLE I.

JULIAN DAY NUMBER.

DAYS ELAPSED AT MEAN NOON OF JANUARY 0 OF EACH YEAR OF THE TABLE.

Yr. A.D.	0	100	200	300	400	500	600	700	800	900
0	172 1057	175 7582	179 4107	183 0632	186 7157	190 3682	194 0207	197 6732	201 3257	204 9782
4	172 2518	175 9043	179 5568	183 2093	186 8618	190 5143	194 1668	197 8193	201 4718	205 1243
8	172 3979	176 0504	179 7029	183 3554	187 0079	190 6604	194 3129	197 9654	201 6179	205 2704
12	172 5440	176 1965	179 8490	183 5015	187 1540	190 8065	194 4590	198 1115	201 7640	205 4165
16	172 6901	176 3426	179 9951	183 6476	187 3001	190 9526	194 6051	198 2576	201 9101	205 5626
20	172 8362	176 4887	180 1412	183 7937	187 4462	191 0987	194 7512	198 4037	202 0562	205 7087
24	172 9823	176 6348	180 2873	183 9398	187 5923	191 2448	194 8973	198 5498	202 2023	205 8548
28	173 1284	176 7809	180 4334	184 0859	187 7384	191 3909	195 0434	198 6959	202 3484	206 0009
32	173 2745	176 9270	180 5795	184 2320	187 8845	191 5370	195 1895	198 8420	202 4945	206 1470
36	173 4206	177 0731	180 7256	184 3781	188 0306	191 6831	195 3356	198 9881	202 6406	206 2931
40	173 5667	177 2192	180 8717	184 5242	188 1767	191 8292	195 4817	199 1342	202 7867	206 4392
44	173 7128	177 3653	181 0178	184 6703	188 3228	191 9753	195 6278	199 2803	202 9328	206 5853
48	173 8589	177 5114	181 1639	184 8164	188 4689	192 1214	195 7739	199 4264	203 0789	206 7314
52	174 0050	177 6575	181 3100	184 9625	188 6150	192 2675	195 9200	199 5725	203 2250	206 8775
56	174 1511	177 8036	181 4561	185 1086	188 7611	192 4136	196 0661	199 7186	203 3711	207 0236
60	174 2972	177 9497	181 6022	185 2547	188 9072	192 5597	196 2122	199 8647	203 5172	207 1697
64	174 4433	178 0958	181 7483	185 4008	189 0533	192 7058	196 3583	200 0108	203 6633	207 3158
68	174 5894	178 2419	181 8944	185 5469	189 1994	192 8519	196 5044	200 1569	203 8094	207 4619
72	174 7355	178 3880	182 0405	185 6930	189 3455	192 9980	196 6505	200 3030	203 9555	207 6080
76	174 8816	178 5341	182 1866	185 8391	189 4916	193 1441	196 7966	200 4491	204 1016	207 7541
80	175 0277	178 6802	182 3327	185 9852	189 6377	193 2902	196 9427	200 5952	204 2477	207 9002
84	175 1738	178 8263	182 4788	186 1313	189 7838	193 4363	197 0888	200 7413	204 3938	208 0463
88	175 3199	178 9724	182 6249	186 2774	189 9299	193 5824	197 2349	200 8874	204 5399	208 1924
92	175 4660	179 1185	182 7710	186 4235	190 0760	193 7285	197 3810	201 0335	204 6860	208 3385
96	175 6121	179 2646	182 9171	186 5696	190 2221	193 8746	197 5271	201 1796	204 8321	208 4846

To obtain the Julian Day Number for any date before the beginning of the Christian Era, the date must first be expressed astronomically, i.e., diminished by 1. Then add the smallest multiple of 1000 years that will convert the date into an A.D. date, take out the Julian Day Number for the A.D. date thus obtained, and subtract 365250 days for each multiple of 1000 years added.

Example :—Required the Julian Day Number of May 5, 1234 B.C.

Astronomical date = — 1233 May 5

2 × 1000 = + 2000

Sum = + 767 May 5

Julian Day Number on January 0 of A.D. 764 .. 200 0108

Days from January 0 to May 0, 3 years later .. 1216

Days from May 0 to May 5 5

Sum = Julian Day Number A.D. 767, May 5 .. 200 1329

Two multiples of 365250 days 73 0500

Difference = Julian Day Number May 5, 1234 B.C. 127 0829

TABLE I.

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JULIAN DAY NUMBER.

DAYS ELAPSED AT MEAN NOON OF JANUARY 0 OF EACH YEAR OF THE TABLE.

Yr. A.D.	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900
0	208 6307	212 2832	215 9357	219 5882	223 2407	226 8932	230 5447	234 1971*	237 8495*	241 5019*
4	208 7768	212 4293	216 0818	219 7343	223 3868	227 0393	230 6908	234 3432	237 9956	241 6480
8	208 9229	212 5754	216 2279	219 8804	223 5329	227 1854	230 8369	234 4893	238 1417	241 7941
12	209 0690	212 7215	216 3740	220 0265	223 6790	227 3315	230 9830	234 6354	238 2878	241 9402
16	209 2151	212 8676	216 5201	220 1726	223 8251	227 4776	231 1291	234 7815	238 4339	242 0863
20	209 3612	213 0137	216 6662	220 3187	223 9712	227 6237	231 2752	234 9276	238 5800	242 2324
24	209 5073	213 1598	216 8123	220 4648	224 1173	227 7698	231 4213	235 0737	238 7261	242 3785
28	209 6534	213 3059	216 9584	220 6109	224 2634	227 9159	231 5674	235 2198	238 8722	242 5246
32	209 7995	213 4520	217 1045	220 7570	224 4095	228 0620	231 7135	235 3659	239 0183	242 6707
36	209 9456	213 5981	217 2506	220 9031	224 5556	228 2081	231 8596	235 5120	239 1644	242 8168
40	210 0917	213 7442	217 3967	221 0492	224 7017	228 3542	232 0057	235 6581	239 3105	242 9629
44	210 2378	213 8903	217 5428	221 1953	224 8478	228 5003	232 1518	235 8042	239 4566	243 1090
48	210 3839	214 0364	217 6889	221 3414	224 9939	228 6464	232 2979	235 9503	239 6027	243 2551
52	210 5300	214 1825	217 8350	221 4875	225 1400	228 7925	232 4440	236 0964	239 7488	243 4012
56	210 6761	214 3286	217 9811	221 6336	225 2861	228 9386	232 5901	236 2425	239 8949	243 5473
60	210 8222	214 4747	218 1272	221 7797	225 4322	229 0847	232 7362	236 3886	240 0410	243 6934
64	210 9683	214 6208	218 2733	221 9258	225 5783	229 2308	232 8823	236 5347	240 1871	243 8395
68	211 1144	214 7669	218 4194	222 0719	225 7244	229 3769	233 0284	236 6808	240 3332	243 9856
72	211 2605	214 9130	218 5655	222 2180	225 8705	229 5230	233 1745	236 8269	240 4793	244 1317
76	211 4066	215 0591	218 7116	222 3641	226 0166	229 6691	233 3206	236 9730	240 6254	244 2778
80	211 5527	215 2052	218 8577	222 5102	226 1627	229 8152	233 4667	237 1191	240 7715	244 4239
84	211 6988	215 3513	219 0038	222 6563	226 3088	229 9603	233 6128	237 2652	240 9176	244 5700
88	211 8449	215 4974	219 1499	222 8024	226 4549	230 1064	233 7589	237 4113	241 0637	244 7161
92	211 9910	215 6435	219 2960	222 9485	226 6010	230 2525	233 9050	237 5574	241 2098	244 8622
96	212 1371	215 7896	219 4421	223 0946	226 7471	230 3986	234 0511	237 7035	241 3559	245 0083

NUMBER OF DAYS TO BE ADDED TO REDUCE TO THE BEGINNING OF EACH MONTH.

Year	Jan. 0	Feb. 0	Mar. 0	Apr. 0	May 0	June 0	July 0	Aug. 0	Sept. 0	Oct. 0	Nov. 0	Dec. 0
0	0*	31*	60	91	121	152	182	213	244	274	305	335
1	366	397	425	456	486	517	547	578	609	639	670	700
2	731	762	790	821	851	882	912	943	974	1004	1035	1065
3	1096	1127	1155	1186	1216	1247	1277	1308	1339	1369	1400	1430

Note.—From 1582 Oct. 15 to 1583 Dec. 31 inclusive, the numbers given by the above tables must be diminished by 10.

* The numbers given for the years 1700, 1800 and 1900, which were not Leap Years, are for January — 1, consequently the numbers 0 and 31 for Jan. 0 and Feb. 0 of these years must be increased to 1 and 32. For all other months the two tables are used in the normal manner.

A more extended table for the years 1850–1940 is given in Table II. For the current year see pages 2–5.

TABLE II.

JULIAN DAY NUMBER.

DAYS ELAPSED AT MEAN NOON OF EACH DATE OF THE TABLE.

Year	Jan. o	Feb. o	Mar. o	Apr. o	May o	June o	July o	Aug. o	Sept. o	Oct. o	Nov. o	Dec. o
1850	239 6758	6789	6817	6848	6878	6909	6939	6970	7001	7031	7062	7092
1851	239 7123	7154	7182	7213	7243	7274	7304	7335	7366	7396	7427	7457
1852	239 7488	7519	7548	7579	7609	7640	7670	7701	7732	7762	7793	7823
1853	239 7854	7885	7913	7944	7974	8005	8035	8066	8097	8127	8158	8188
1854	239 8219	8250	8278	8309	8339	8370	8400	8431	8462	8492	8523	8553
1855	239 8584	8615	8643	8674	8704	8735	8765	8796	8827	8857	8888	8918
1856	239 8949	8980	9009	9040	9070	9101	9131	9162	9193	9223	9254	9284
1857	239 9315	9346	9374	9405	9435	9466	9496	9527	9558	9588	9619	9649
1858	239 9680	9711	9739	9770	9800	9831	9861	9892	9923	9953	9984	*0014
1859	240 0045	0076	0104	0135	0165	0196	0226	0257	0288	0318	0349	0379
1860	240 0410	0441	0470	0501	0531	0562	0592	0623	0654	0684	0715	0745
1861	240 0776	0807	0835	0866	0896	0927	0957	0988	1019	1049	1080	1110
1862	240 1141	1172	1200	1231	1261	1292	1322	1353	1384	1414	1445	1475
1863	240 1506	1537	1565	1596	1626	1657	1687	1718	1749	1779	1810	1840
1864	240 1871	1902	1931	1962	1992	2023	2053	2084	2115	2145	2176	2206
1865	240 2237	2268	2296	2327	2357	2388	2418	2449	2480	2510	2541	2571
1866	240 2602	2633	2661	2692	2722	2753	2783	2814	2845	2875	2906	2936
1867	240 2967	2998	3026	3057	3087	3118	3148	3179	3210	3240	3271	3301
1868	240 3332	3363	3392	3423	3453	3484	3514	3545	3576	3606	3637	3667
1869	240 3698	3729	3757	3788	3818	3849	3879	3910	3941	3971	4002	4032
1870	240 4063	4094	4122	4153	4183	4214	4244	4275	4306	4336	4367	4397
1871	240 4428	4459	4487	4518	4548	4579	4609	4640	4671	4701	4732	4762
1872	240 4793	4824	4853	4884	4914	4945	4975	5006	5037	5067	5098	5128
1873	240 5159	5190	5218	5249	5279	5310	5340	5371	5402	5432	5463	5493
1874	240 5524	5555	5583	5614	5644	5675	5705	5736	5767	5797	5828	5858
1875	240 5889	5920	5948	5979	6009	6040	6070	6101	6132	6162	6193	6223
1876	240 6254	6285	6314	6345	6375	6406	6436	6467	6498	6528	6559	6589
1877	240 6620	6651	6679	6710	6740	6771	6801	6832	6863	6893	6924	6954
1878	240 6985	7016	7044	7075	7105	7136	7166	7197	7228	7258	7289	7319
1879	240 7350	7381	7409	7440	7470	7501	7531	7562	7593	7623	7654	7684
1880	240 7715	7746	7775	7806	7836	7867	7897	7928	7959	7989	8020	8050
1881	240 8081	8112	8140	8171	8201	8232	8262	8293	8324	8354	8385	8415
1882	240 8446	8477	8505	8536	8566	8597	8627	8658	8689	8719	8750	8780
1883	240 8811	8842	8870	8901	8931	8962	8992	9023	9054	9084	9115	9145
1884	240 9176	9207	9236	9267	9297	9328	9358	9389	9420	9450	9481	9511
1885	240 9542	9573	9601	9632	9662	9693	9723	9754	9785	9815	9846	9876
1886	240 9907	9938	9966	9997	*0027	*0058	*0088	*0119	*0150	*0180	*0211	*0241
1887	241 0272	0303	0331	0362	0392	0423	0453	0484	0515	0545	0576	0606
1888	241 0637	0668	0697	0728	0758	0789	0819	0850	0881	0911	0942	0972
1889	241 1003	1034	1062	1093	1123	1154	1184	1215	1246	1276	1307	1337
1890	241 1368	1399	1427	1458	1488	1519	1549	1580	1611	1641	1672	1702
1891	241 1733	1764	1792	1823	1853	1884	1914	1945	1976	2006	2037	2067
1892	241 2098	2129	2158	2189	2219	2250	2280	2311	2342	2372	2403	2433
1893	241 2464	2495	2523	2554	2584	2615	2645	2676	2707	2737	2768	2798
1894	241 2829	2860	2888	2919	2949	2980	3010	3041	3072	3102	3133	3163

For dates before 1850 see Table I.

TABLE II.

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JULIAN DAY NUMBER.

DAYS ELAPSED AT MEAN NOON OF EACH DATE OF THE TABLE.

Year	Jan. o	Feb. o	Mar. o	Apr. o	May o	June o	July o	Aug. o	Sept. o	Oct. o	Nov. o	Dec. o
1895	241 3194	3225	3253	3284	3314	3345	3375	3406	3437	3467	3498	3528
1896	241 3559	3590	3619	3650	3680	3711	3741	3772	3803	3833	3864	3894
1897	241 3925	3956	3984	4015	4045	4076	4106	4137	4168	4198	4229	4259
1898	241 4290	4321	4349	4380	4410	4441	4471	4502	4533	4563	4594	4624
1899	241 4655	4686	4714	4745	4775	4806	4836	4867	4898	4928	4959	4989
1900	241 5020	5051	5079	5110	5140	5171	5201	5232	5263	5293	5324	5354
1901	241 5385	5416	5444	5475	5505	5536	5566	5597	5628	5658	5689	5719
1902	241 5750	5781	5809	5840	5870	5901	5931	5962	5993	6023	6054	6084
1903	241 6115	6146	6174	6205	6235	6266	6296	6327	6358	6388	6419	6449
1904	241 6480	6511	6540	6571	6601	6632	6662	6693	6724	6754	6785	6815
1905	241 6846	6877	6905	6936	6966	6997	7027	7058	7089	7119	7150	7180
1906	241 7211	7242	7270	7301	7331	7362	7392	7423	7454	7484	7515	7545
1907	241 7576	7607	7635	7666	7696	7727	7757	7788	7819	7849	7880	7910
1908	241 7941	7972	8001	8032	8062	8093	8123	8154	8185	8215	8246	8276
1909	241 8307	8338	8366	8397	8427	8458	8488	8519	8550	8580	8611	8641
1910	241 8672	8703	8731	8762	8792	8823	8853	8884	8915	8945	8976	9006
1911	241 9037	9068	9096	9127	9157	9188	9218	9249	9280	9310	9341	9371
1912	241 9402	9433	9462	9493	9523	9554	9584	9615	9646	9676	9707	9737
1913	241 9768	9799	9827	9858	9888	9919	9949	9980	*0011	*0041	*0072	*0102
1914	242 0133	0164	0192	0223	0253	0284	0314	0345	0376	0406	0437	0467
1915	242 0498	0529	0557	0588	0618	0649	0679	0710	0741	0771	0802	0832
1916	242 0863	0894	0923	0954	0984	1015	1045	1076	1107	1137	1168	1198
1917	242 1229	1260	1288	1319	1349	1380	1410	1441	1472	1502	1533	1563
1918	242 1594	1625	1653	1684	1714	1745	1775	1806	1837	1867	1898	1928
1919	242 1959	1990	2018	2049	2079	2110	2140	2171	2202	2232	2263	2293
1920	242 2324	2355	2384	2415	2445	2476	2506	2537	2568	2598	2629	2659
1921	242 2690	2721	2749	2780	2810	2841	2871	2902	2933	2963	2994	3024
1922	242 3055	3086	3114	3145	3175	3206	3236	3267	3298	3328	3359	3389
1923	242 3420	3451	3479	3510	3540	3571	3601	3632	3663	3693	3724	3754
1924	242 3785	3816	3845	3876	3906	3937	3967	3998	4029	4059	4090	4120
1925	242 4151	4182	4210	4241	4271	4302	4332	4363	4394	4424	4455	4485
1926	242 4516	4547	4575	4606	4636	4667	4697	4728	4759	4789	4820	4850
1927	242 4881	4912	4940	4971	5001	5032	5062	5093	5124	5154	5185	5215
1928	242 5246	5277	5306	5337	5367	5398	5428	5459	5490	5520	5551	5581
1929	242 5612	5643	5671	5702	5732	5763	5793	5824	5855	5885	5916	5946
1930	242 5977	6008	6036	6067	6097	6128	6158	6189	6220	6250	6281	6311
1931	242 6342	6373	6401	6432	6462	6493	6523	6554	6585	6615	6646	6676
1932	242 6707	6738	6767	6798	6828	6859	6889	6920	6951	6981	7012	7042
1933	242 7073	7104	7132	7163	7193	7224	7254	7285	7316	7346	7377	7407
1934	242 7438	7469	7497	7528	7558	7589	7619	7650	7681	7711	7742	7772
1935	242 7803	7834	7862	7893	7923	7954	7984	8015	8046	8076	8107	8137
1936	242 8168	8199	8228	8259	8289	8320	8350	8381	8412	8442	8473	8503
1937	242 8534	8565	8593	8624	8654	8685	8715	8746	8777	8807	8838	8868
1938	242 8899	8930	8958	8989	9019	9050	9080	9111	9142	9172	9203	9233
1939	242 9264	9295	9323	9354	9384	9415	9445	9476	9507	9537	9568	9598

The Julian Day Number for each day of the current year is given on pages 2—5.

TABLE III.

FOR CONVERTING INTERVALS OF MEAN SOLAR TIME INTO
EQUIVALENT INTERVALS OF SIDEREAL TIME.

HOURS.			MINUTES.				SECONDS.				
Mean Time.	Equivalent in Sidereal Time.		Mean Time.	Equivalent in Sidereal Time.		Mean Time.	Equivalent in Sidereal Time.		Mean Time.	Equivalent in Sidereal Time.	
	^h	^m ^s		^m ^s			^s			^s	
01	01	00 09.856	01	01 00.164	31	31 05.093	01	01.003	31	31.085	
02	02	00 19.713	02	02 00.329	32	32 05.257	02	02.005	32	32.088	
03	03	00 29.569	03	03 00.493	33	33 05.421	03	03.008	33	33.090	
04	04	00 39.426	04	04 00.657	34	34 05.585	04	04.011	34	34.093	
05	05	00 49.282	05	05 00.821	35	35 05.750	05	05.014	35	35.096	
06	06	00 59.139	06	06 00.986	36	36 05.914	06	06.016	36	36.099	
07	07	01 08.995	07	07 01.150	37	37 06.078	07	07.019	37	37.101	
08	08	01 18.852	08	08 01.314	38	38 06.242	08	08.022	38	38.104	
09	09	01 28.708	09	09 01.478	39	39 06.407	09	09.025	39	39.107	
10	10	01 38.565	10	10 01.643	40	40 06.571	10	10.027	40	40.110	
11	11	01 48.421	11	11 01.807	41	41 06.735	11	11.030	41	41.112	
12	12	01 58.278	12	12 01.971	42	42 06.900	12	12.033	42	42.115	
13	13	02 08.134	13	13 02.136	43	43 07.064	13	13.036	43	43.118	
14	14	02 17.991	14	14 02.300	44	44 07.228	14	14.038	44	44.120	
15	15	02 27.847	15	15 02.464	45	45 07.392	15	15.041	45	45.123	
16	16	02 37.704	16	16 02.628	46	46 07.557	16	16.044	46	46.126	
17	17	02 47.560	17	17 02.793	47	47 07.721	17	17.047	47	47.129	
18	18	02 57.417	18	18 02.957	48	48 07.885	18	18.049	48	48.131	
19	19	03 07.273	19	19 03.121	49	49 08.049	19	19.052	49	49.134	
20	20	03 17.129	20	20 03.285	50	50 08.214	20	20.055	50	50.137	
21	21	03 26.986	21	21 03.450	51	51 08.378	21	21.057	51	51.140	
22	22	03 36.842	22	22 03.614	52	52 08.542	22	22.060	52	52.142	
23	23	03 46.699	23	23 03.778	53	53 08.707	23	23.063	53	53.145	
FRACTIONS OF A SECOND.			24	24 03.943	54	54 08.871	24	24.066	54	54.148	
			25	25 04.107	55	55 09.035	25	25.068	55	55.151	
The sidereal equivalent of a mean time second is equal to that fraction increased by the			26	26 04.271	56	56 09.199	26	26.071	56	56.153	
			27	27 04.435	57	57 09.364	27	27.074	57	57.156	
			28	28 04.600	58	58 09.528	28	28.077	58	58.159	
			29	29 04.764	59	59 09.692	29	29.079	59	59.162	
			30	30 04.928	60	60 09.856	30	30.082	60	60.164	

FRACTIONS OF A SECOND.

The sidereal equivalent of a fraction of a mean time second is equal to that fraction *increased* by the amount in the following critical table.

Fraction of a Second Amount to be Added

0.000	0.000
0.182	.0001
0.547	.001
0.913	.002
1.000	.003

In critical cases ascend.

Sidereal time *required* = Sidereal time at 0^h + the sidereal equivalent of the *given* mean time.

Example.—What is the Greenwich sidereal time at 1931 January 11^d 19^h 41^m 22^s.93 G.M.T.?

Sidereal time at	..	11 ^d 00 ^h ..	^h ^m ^s	07 18 09.18
Sidereal equivalent of		19 ^h ..		19 03 07.273
"	"	41 ^m ..		41 06.735
"	"	22 ^s ..		22.060
"	"	0 ^s .93 ..		0.933
Sum = Required sidereal time	..	03 02 46.18		

TABLE IV.

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FOR CONVERTING INTERVALS OF SIDEREAL TIME INTO
EQUIVALENT INTERVALS OF MEAN SOLAR TIME.

HOURS.			MINUTES.				SECONDS.					
Sidereal Time.	Equivalent in Mean Time.		Sidereal Time.	Equivalent in Mean Time.		Sidereal Time.	Equivalent in Mean Time.		Sidereal Time.	Equivalent in Mean Time.		
01	h	m s	01	m	s	31	m	s	01	s		
02	00	59 50.170	02	00	59.836	32	30	54.921	02	00.997	31	30.915
03	01	59 40.341	03	01	59.672	33	31	54.758	03	01.995	32	31.913
04	02	59 30.511	04	02	59.509	34	32	54.594	04	02.992	33	32.910
05	03	59 20.682	05	03	59.345	35	33	54.430	05	03.989	34	33.907
06	04	59 10.852	06	04	59.181	36	34	54.266	06	04.986	35	34.904
07	05	59 01.023	07	05	59.017	37	35	54.102	07	05.984	36	35.902
08	06	58 51.193	08	06	58.853	38	36	53.938	08	06.981	37	36.899
09	07	58 41.364	09	07	58.689	39	37	53.775	09	07.978	38	37.896
10	08	58 31.534	10	08	58.526	40	38	53.611	10	08.975	39	38.893
11	09	58 21.704	11	09	58.362	41	39	53.447	11	09.973	40	39.891
12	10	58 11.875	12	10	58.198	42	40	53.283	12	10.970	41	40.888
13	11	58 02.045	13	11	58.034	43	41	53.119	13	11.967	42	41.885
14	12	57 52.216	14	12	57.870	44	42	52.956	14	12.964	43	42.883
15	13	57 42.386	15	13	57.706	45	43	52.792	15	13.962	44	43.880
16	14	57 32.557	16	14	57.543	46	44	52.628	16	14.959	45	44.877
17	15	57 22.727	17	15	57.379	47	45	52.464	17	15.956	46	45.874
18	16	57 12.897	18	16	57.215	48	46	52.300	18	16.954	47	46.872
19	17	57 03.068	19	17	57.051	49	47	52.136	19	17.951	48	47.869
20	18	56 53.238	20	18	56.887	50	48	51.973	20	18.948	49	48.866
21	19	56 43.409	21	19	56.723	51	49	51.809	21	19.945	50	49.863
22	20	56 33.579	22	20	56.560	52	50	51.645	22	20.943	51	50.861
23	21	56 23.750	23	21	56.396	53	51	51.481	23	21.940	52	51.858
24	22	56 13.920	24	22	56.232	54	52	51.317	24	22.937	53	52.855
25			25	23	56.068	55	53	51.153	25	23.934	54	53.853
26			26	24	55.904	56	54	50.990	26	24.932	55	54.850
27			27	25	55.741	57	55	50.826	27	25.929	56	55.847
28			28	26	55.577	58	56	50.662	28	26.926	57	56.844
29			29	27	55.413	59	57	50.498	29	27.924	58	57.842
30			30	28	55.249	60	58	50.334	30	28.921	59	58.839
				29	55.085		59	50.170		29.918	60	59.836

FRACTIONS OF A SECOND.

The mean solar equivalent of a fraction of a sidereal second is equal to that fraction diminished by the

FRACTIONS OF A SECOND.

The mean solar equivalent of a fraction of a sidereal second is equal to that fraction diminished by the amount in the following critical table.

Fraction of a Second Amount to be Subtracted

0.000	0.000
0.183	.001
0.549	.002
0.915	.003
1.000	

In critical cases ascend.

Mean time required = Mean time of the preceding transit of the First Point of Aries + the mean time equivalent of the given sidereal time.

Example.—What is the G.M.T. on 1931 January 11 when the Greenwich sidereal time is 03^h 02^m 46^s.18?

Transit of the First Point of Aries	h	m	s
Mean time equivalent of 03 ^h	..	02	59 30.511
" "	02 ^m	..	01 59.672
" "	46 ^s	..	45.874
" "	08.18	..	0.180
Sum = Required mean time	..	19 41	22.93

TABLE V.
CONVERSION OF ARC TO TIME.

DEGREES						MINUTES		SECONDS					
°	'	"	°	'	"	'	"	"	"	"	"	"	"
0	0	00	60	4	00	120	8	00	0	000	00	000	050
1	0	04	61	4	04	121	8	04	1	007	01	001	51
2	0	08	62	4	08	122	8	08	2	013	02	001	52
3	0	12	63	4	12	123	8	12	3	020	03	002	53
4	0	16	64	4	16	124	8	16	4	027	04	003	54
5	0	20	65	4	20	125	8	20	5	033	05	003	55
6	0	24	66	4	24	126	8	24	6	040	06	004	56
7	0	28	67	4	28	127	8	28	7	047	07	005	57
8	0	32	68	4	32	128	8	32	8	053	08	005	58
9	0	36	69	4	36	129	8	36	9	060	09	006	59
10	0	40	70	4	40	130	8	40	10	067	10	007	60
11	0	44	71	4	44	131	8	44	11	073	11	007	61
12	0	48	72	4	48	132	8	48	12	080	12	008	62
13	0	52	73	4	52	133	8	52	13	087	13	009	63
14	0	56	74	4	56	134	8	56	14	093	14	009	64
15	1	00	75	5	00	135	9	00	15	100	15	010	65
16	1	04	76	5	04	136	9	04	16	107	16	011	66
17	1	08	77	5	08	137	9	08	17	113	17	011	67
18	1	12	78	5	12	138	9	12	18	120	18	012	68
19	1	16	79	5	16	139	9	16	19	127	19	013	69
20	1	20	80	5	20	140	9	20	20	133	20	013	70
21	1	24	81	5	24	141	9	24	21	140	21	014	71
22	1	28	82	5	28	142	9	28	22	147	22	015	72
23	1	32	83	5	32	143	9	32	23	153	23	015	73
24	1	36	84	5	36	144	9	36	24	160	24	016	74
25	1	40	85	5	40	145	9	40	25	167	25	017	75
26	1	44	86	5	44	146	9	44	26	173	26	017	76
27	1	48	87	5	48	147	9	48	27	180	27	018	77
28	1	52	88	5	52	148	9	52	28	187	28	019	78
29	1	56	89	5	56	149	9	56	29	193	29	019	79
30	2	00	90	6	00	150	10	00	30	200	30	020	80
31	2	04	91	6	04	151	10	04	31	207	31	021	81
32	2	08	92	6	08	152	10	08	32	213	32	021	82
33	2	12	93	6	12	153	10	12	33	220	33	022	83
34	2	16	94	6	16	154	10	16	34	227	34	023	84
35	2	20	95	6	20	155	10	20	35	233	35	023	85
36	2	24	96	6	24	156	10	24	36	240	36	024	86
37	2	28	97	6	28	157	10	28	37	247	37	025	87
38	2	32	98	6	32	158	10	32	38	253	38	025	88
39	2	36	99	6	36	159	10	36	39	260	39	026	89
40	2	40	100	6	40	160	10	40	40	267	40	027	90
41	2	44	101	6	44	161	10	44	41	273	41	027	91
42	2	48	102	6	48	162	10	48	42	280	42	028	92
43	2	52	103	6	52	163	10	52	43	287	43	029	93
44	2	56	104	6	56	164	10	56	44	293	44	029	94
45	3	00	105	7	00	165	11	00	45	300	45	030	95
46	3	04	106	7	04	166	11	04	46	307	46	031	96
47	3	08	107	7	08	167	11	08	47	313	47	031	97
48	3	12	108	7	12	168	11	12	48	320	48	032	98
49	3	16	109	7	16	169	11	16	49	327	49	033	99
50	3	20	110	7	20	170	11	20	50	333	50	033	100
51	3	24	111	7	24	171	11	24	51	340	51		
52	3	28	112	7	28	172	11	28	52	347	52		
53	3	32	113	7	32	173	11	32	53	353	53		
54	3	36	114	7	36	174	11	36	54	360	54		
55	3	40	115	7	40	175	11	40	55	367	55		
56	3	44	116	7	44	176	11	44	56	373	56		
57	3	48	117	7	48	177	11	48	57	380	57		
58	3	52	118	7	52	178	11	52	58	387	58		
59	3	56	119	7	56	179	11	56	59	393	59		

TABLE VI.
CONVERSION OF TIME TO ARC.

	0 ^h	1 ^h	2 ^h	3 ^h	4 ^h	5 ^h	SECONDS					
m	0	1	2	3	4	5	8	9	10	11	12	13
0	0 00	15 00	30 00	45 00	60 00	75 00	0 00	0 00	0 00	0 50	7 50	
1	0 15	15 15	30 15	45 15	60 15	75 15	1 0 15	0 15	0 15	51	7 65	
2	0 30	15 30	30 30	45 30	60 30	75 30	2 0 30	0 30	0 30	52	7 80	
3	0 45	15 45	30 45	45 45	60 45	75 45	3 0 45	0 45	0 45	53	7 95	
4	1 00	16 00	31 00	46 00	61 00	76 00	4 1 00	1 00	0 60	54	8 10	
5	1 15	16 15	31 15	46 15	61 15	76 15	5 1 15	0 05	0 75	0 55	8 25	
6	1 30	16 30	31 30	46 30	61 30	76 30	6 1 30	0 06	0 90	56	8 40	
7	1 45	16 45	31 45	46 45	61 45	76 45	7 1 45	0 07	1 05	57	8 55	
8	2 00	17 00	32 00	47 00	62 00	77 00	8 2 00	0 08	1 20	58	8 70	
9	2 15	17 15	32 15	47 15	62 15	77 15	9 2 15	0 09	1 35	59	8 85	
10	2 30	17 30	32 30	47 30	62 30	77 30	10 2 30	0 10	1 50	0 60	9 00	
11	2 45	17 45	32 45	47 45	62 45	77 45	11 2 45	0 11	1 65	61	9 15	
12	3 00	18 00	33 00	48 00	63 00	78 00	12 3 00	0 12	1 80	62	9 30	
13	3 15	18 15	33 15	48 15	63 15	78 15	13 3 15	0 13	1 95	63	9 45	
14	3 30	18 30	33 30	48 30	63 30	78 30	14 3 30	0 14	2 10	64	9 60	
15	3 45	18 45	33 45	48 45	63 45	78 45	15 3 45	0 15	2 25	0 65	9 75	
16	4 00	19 00	34 00	49 00	64 00	79 00	16 4 00	0 16	2 40	66	9 90	
17	4 15	19 15	34 15	49 15	64 15	79 15	17 4 15	0 17	2 55	67	10 05	
18	4 30	19 30	34 30	49 30	64 30	79 30	18 4 30	0 18	2 70	68	10 20	
19	4 45	19 45	34 45	49 45	64 45	79 45	19 4 45	0 19	2 85	69	10 35	
20	5 00	20 00	35 00	50 00	65 00	80 00	20 5 00	0 20	3 00	0 70	10 50	
21	5 15	20 15	35 15	50 15	65 15	80 15	21 5 15	0 21	3 15	71	10 65	
22	5 30	20 30	35 30	50 30	65 30	80 30	22 5 30	0 22	3 30	72	10 80	
23	5 45	20 45	35 45	50 45	65 45	80 45	23 5 45	0 23	3 45	73	10 95	
24	6 00	21 00	36 00	51 00	66 00	81 00	24 6 00	0 24	3 60	74	11 10	
25	6 15	21 15	36 15	51 15	66 15	81 15	25 6 15	0 25	3 75	0 75	11 25	
26	6 30	21 30	36 30	51 30	66 30	81 30	26 6 30	0 26	3 90	76	11 40	
27	6 45	21 45	36 45	51 45	66 45	81 45	27 6 45	0 27	4 05	77	11 55	
28	7 00	22 00	37 00	52 00	67 00	82 00	28 7 00	0 28	4 20	78	12 10	
29	7 15	22 15	37 15	52 15	67 15	82 15	29 7 15	0 29	4 35	79	12 25	
30	7 30	22 30	37 30	52 30	67 30	82 30	30 7 30	0 30	4 50	80	12 40	
31	7 45	22 45	37 45	52 45	67 45	82 45	31 7 45	0 31	4 65	81	12 55	
32	8 00	23 00	38 00	53 00	68 00	83 00	32 8 00	0 32	4 80	82	13 10	
33	8 15	23 15	38 15	53 15	68 15	83 15	33 8 15	0 33	4 95	83	13 25	
34	8 30	23 30	38 30	53 30	68 30	83 30	34 8 30	0 34	5 10	84	13 40	
35	8 45	23 45	38 45	53 45	68 45	83 45	35 8 45	0 35	5 25	0 85	13 55	
36	9 00	24 00	39 00	54 00	69 00	84 00	36 9 00	0 36	5 40	86	14 10	
37	9 15	24 15	39 15	54 15	69 15	84 15	37 9 15	0 37	5 55	87	14 25	
38	9 30	24 30	39 30	54 30	69 30	84 30	38 9 30	0 38	5 70	88	14 40	
39	9 45	24 45	39 45	54 45	69 45	84 45	39 9 45	0 39	5 85	89	14 55	
40	10 00	25 00	40 00	55 00	70 00	85 00	40 10 00	0 40	6 00	0 90	15 10	
41	10 15	25 15	40 15	55 15	70 15	85 15	41 10 15	0 41	6 15	91	15 25	
42	10 30	25 30	40 30	55 30	70 30	85 30	42 10 30	0 42	6 30	92	15 40	
43	10 45	25 45	40 45	55 45	70 45	85 45	43 10 45	0 43	6 45	93	15 55	
44	11 00	26 00	41 00	56 00	71 00	86 00	44 11 00	0 44	6 60	94	16 10	
45	11 15	26 15	41 15	56 15	71 15	86 15	45 11 15	0 45	6 75	0 95	16 25	
46	11 30	26 30	41 30	56 30	71 30	86 30	46 11 30	0 46	6 90	96	16 40	
47	11 45	26 45	41 45	56 45	71 45	86 45	47 11 45	0 47	7 05	97	16 55	
48	12 00	27 00	42 00	57 00	72 00	87 00	48 12 00	0 48	7 20	98	17 10	
49	12 15	27 15	42 15	57 15	72 15	87 15	49 12 15	0 49	7 35	0 99	17 25	
50	12 30	27 30	42 30	57 30	72 30	87 30	50 12 30	0 50	7 50	1 00	17 40	
51	12 45	27 45	42 45	57 45	72 45	87 45	51 12 45					
52	13 00	28 00	43 00	58 00	73 00	88 00	52 13 00					
53	13 15	28 15	43 15	58 15	73 15	88 15	53 13 15					
54	13 30	28 30	43 30	58 30	73 30	88 30	54 13 30					
55	13 45	28 45	43 45	58 45	73 45	88 45	55 13 45					
56	14 00	29 00	44 00	59 00	74 00	89 00	56 14 00					
57	14 15	29 15	44 15	59 15	74 15	89 15	57 14 15					
58	14 30	29 30	44 30	59 30	74 30	89 30	58 14 30					
59	14 45	29 45	44 45	59 45	74 45	89 45	59 14 45					

h = 0
12 = 180
18 = 270

CONVERSION OF MINUTES AND SECONDS TO DECIMALS OF A DEGREE.

	0'	1'	2'	3'	4'	5'		
0	0.00000	0.01667	0.03333	0.05000	0.06667	0.08333	0	0.0
1	0028	1694	3361	5028	6694	8361	6	.1
2	0056	1722	3389	5056	6722	8389	12	.2
3	0083	1750	3417	5083	6750	8417	18	.3
4	0111	1778	3444	5111	6778	8444	24	.4
5	0.00139	0.01806	0.03472	0.05139	0.06806	0.08472	30	0.5
6	0167	1833	3500	5167	6833	8500	36	.6
7	0194	1861	3528	5194	6861	8528	42	.7
8	0222	1889	3556	5222	6889	8556	48	.8
9	0250	1917	3583	5250	6917	8583	54	.9
10	0.00278	0.01944	0.03611	0.05278	0.06944	0.08611	In units of the fifth decimal of a degree.	
11	0306	1972	3639	5306	6972	8639		
12	0333	2000	3667	5333	7000	8667		
13	0361	2028	3694	5361	7028	8694		
14	0389	2056	3722	5389	7056	8722		
15	0.00417	0.02083	0.03750	0.05417	0.07083	0.08750	"	
16	0444	2111	3778	5444	7111	8778	0.00	0
17	0472	2139	3806	5472	7139	8806	.01	1
18	0500	2167	3833	5500	7167	8833	.05	2
19	0528	2194	3861	5528	7194	8861	.09	3
20	0.00556	0.02222	0.03889	0.05556	0.07222	0.08889	.12	4
21	0583	2250	3917	5583	7250	8917	.16	5
22	0611	2278	3944	5611	7278	8944	.19	6
23	0639	2306	3972	5639	7306	8972	.23	7
24	0667	2333	4000	5667	7333	9000	.26	8
25	0.00694	0.02361	0.04028	0.05694	0.07361	0.09028	.30	9
26	0722	2389	4056	5722	7389	9056	.34	10
27	0750	2417	4083	5750	7417	9083	.37	11
28	0778	2444	4111	5778	7444	9111	.41	12
29	0806	2472	4139	5806	7472	9139	.45	13
30	0.00833	0.02500	0.04167	0.05833	0.07500	0.09167	.48	14
31	0861	2528	4194	5861	7528	9194	.52	15
32	0889	2556	4222	5889	7556	9222	.55	16
33	0917	2583	4250	5917	7583	9250	.59	17
34	0944	2611	4278	5944	7611	9278	.62	18
35	0.00972	0.02639	0.04306	0.05972	0.07639	0.09306	.66	19
36	1000	2667	4333	6000	7667	9333	.70	20
37	1028	2694	4361	6028	7694	9361	.73	21
38	1056	2722	4389	6056	7722	9389	.77	22
39	1083	2750	4417	6083	7750	9417	.81	23
40	0.01111	0.02778	0.04444	0.06111	0.07778	0.09444	.84	24
41	1139	2806	4472	6139	7806	9472	.88	25
42	1167	2833	4500	6167	7833	9500	.91	26
43	1194	2861	4528	6194	7861	9528	.95	27
44	1222	2889	4556	6222	7889	9556	0.98	28
45	0.01250	0.02917	0.04583	0.06250	0.07917	0.09583	1.00	
46	1278	2944	4611	6278	7944	9611	In critical cases ascend	
47	1306	2972	4639	6306	7972	9639		
48	1333	3000	4667	6333	8000	9667		
49	1361	3028	4694	6361	8028	9694		
50	0.01389	0.03056	0.04722	0.06389	0.08056	0.09722		
51	1417	3083	4750	6417	8083	9750		
52	1444	3111	4778	6444	8111	9778		
53	1472	3139	4806	6472	8139	9806		
54	1500	3167	4833	6500	8167	9833		
55	0.01528	0.03194	0.04861	0.06528	0.08194	0.09861		
56	1556	3222	4889	6556	8222	9889		
57	1583	3250	4917	6583	8250	9917		
58	1611	3278	4944	6611	8278	9944		
59	1639	3306	4972	6639	8306	9972		

TABLE VIII.

CONVERSION OF DECIMALS OF A DEGREE TO MINUTES AND SECONDS.

0.000	0 00.0	0.050	3 00.0	0.00000	0.00	0.00050	1.80
01	0 03.6	51	3 03.6	01	0.04	51	1.84
02	0 07.2	52	3 07.2	02	0.07	52	1.87
03	0 10.8	53	3 10.8	03	0.11	53	1.91
04	0 14.4	54	3 14.4	04	0.14	54	1.94
0.005	0 18.0	0.055	3 18.0	0.00005	0.18	0.00055	1.98
06	0 21.6	56	3 21.6	06	0.22	56	2.02
07	0 25.2	57	3 25.2	07	0.25	57	2.05
08	0 28.8	58	3 28.8	08	0.29	58	2.09
09	0 32.4	59	3 32.4	09	0.32	59	2.12
0.010	0 36.0	0.060	3 36.0	0.00010	0.36	0.00060	2.16
11	0 39.6	61	3 39.6	11	0.40	61	2.20
12	0 43.2	62	3 43.2	12	0.43	62	2.23
13	0 46.8	63	3 46.8	13	0.47	63	2.27
14	0 50.4	64	3 50.4	14	0.50	64	2.30
0.015	0 54.0	0.065	3 54.0	0.00015	0.54	0.00065	2.34
16	0 57.6	66	3 57.6	16	0.58	66	2.38
17	1 01.2	67	4 01.2	17	0.61	67	2.41
18	1 04.8	68	4 04.8	18	0.65	68	2.45
19	1 08.4	69	4 08.4	19	0.68	69	2.48
0.020	1 12.0	0.070	4 12.0	0.00020	0.72	0.00070	2.52
21	1 15.6	71	4 15.6	21	0.76	71	2.56
22	1 19.2	72	4 19.2	22	0.79	72	2.59
23	1 22.8	73	4 22.8	23	0.83	73	2.63
24	1 26.4	74	4 26.4	24	0.86	74	2.66
0.025	1 30.0	0.075	4 30.0	0.00025	0.90	0.00075	2.70
26	1 33.6	76	4 33.6	26	0.94	76	2.74
27	1 37.2	77	4 37.2	27	0.97	77	2.77
28	1 40.8	78	4 40.8	28	1.01	78	2.81
29	1 44.4	79	4 44.4	29	1.04	79	2.84
0.030	1 48.0	0.080	4 48.0	0.00030	1.08	0.00080	2.88
31	1 51.6	81	4 51.6	31	1.12	81	2.92
32	1 55.2	82	4 55.2	32	1.15	82	2.95
33	1 58.8	83	4 58.8	33	1.19	83	2.99
34	2 02.4	84	5 02.4	34	1.22	84	3.02
0.035	2 06.0	0.085	5 06.0	0.00035	1.26	0.00085	3.06
36	2 09.6	86	5 09.6	36	1.30	86	3.10
37	2 13.2	87	5 13.2	37	1.33	87	3.13
38	2 16.8	88	5 16.8	38	1.37	88	3.17
39	2 20.4	89	5 20.4	39	1.40	89	3.20
0.040	2 24.0	0.090	5 24.0	0.00040	1.44	0.00090	3.24
41	2 27.6	91	5 27.6	41	1.48	91	3.28
42	2 31.2	92	5 31.2	42	1.51	92	3.31
43	2 34.8	93	5 34.8	43	1.55	93	3.35
44	2 38.4	94	5 38.4	44	1.58	94	3.38
0.045	2 42.0	0.095	5 42.0	0.00045	1.62	0.00095	3.42
46	2 45.6	96	5 45.6	46	1.66	96	3.46
47	2 49.2	97	5 49.2	47	1.69	97	3.49
48	2 52.8	98	5 52.8	48	1.73	98	3.53
49	2 56.4	99	5 56.4	49	1.76	99	3.56

CONVERSION OF HOURS, MINUTES AND SECONDS INTO DECIMALS
OF A DAY.

	0 ^h	1 ^h	2 ^h	3 ^h	4 ^h	5 ^h	SECONDS
m	d	d	d	d	d	d	s
0	0.00000	0.04167	0.08333	0.12500	0.16667	0.20833	0.00000
1	.00069	.04236	.08403	.12569	.16736	.20903	.00001
2	.00139	.04306	.08472	.12639	.16806	.20972	.00002
3	.00208	.04375	.08542	.12708	.16875	.21042	.00003
4	.00278	.04444	.08611	.12778	.16944	.21111	.00005
5	0.00347	0.04514	0.08681	0.12847	0.17014	0.21181	0.00006
6	.00417	.04583	.08750	.12917	.17083	.21250	.00007
7	.00486	.04653	.08819	.12986	.17153	.21319	.00008
8	.00556	.04722	.08889	.13056	.17222	.21389	.00009
9	.00625	.04792	.08958	.13125	.17292	.21458	.00010
10	0.00694	0.04861	0.09028	0.13194	0.17361	0.21528	0.00012
11	.00764	.04931	.09097	.13264	.17431	.21597	.00013
12	.00833	.05000	.09167	.13333	.17500	.21667	.00014
13	.00903	.05069	.09236	.13403	.17569	.21736	.00015
14	.00972	.05139	.09306	.13472	.17639	.21806	.00016
15	0.01042	0.05208	0.09375	0.13542	0.17708	0.21875	0.00017
16	.01111	.05278	.09444	.13611	.17778	.21944	.00019
17	.01181	.05347	.09514	.13681	.17847	.22014	.00020
18	.01250	.05417	.09583	.13750	.17917	.22083	.00021
19	.01319	.05486	.09653	.13819	.17986	.22153	.00022
20	0.01389	0.05556	0.09722	0.13889	0.18056	0.22222	0.00023
21	.01458	.05625	.09792	.13958	.18125	.22292	.00024
22	.01528	.05694	.09861	.14028	.18194	.22361	.00025
23	.01597	.05764	.09931	.14097	.18264	.22431	.00027
24	.01667	.05833	.10000	.14167	.18333	.22500	.00028
25	0.01736	0.05903	0.10069	0.14236	0.18403	0.22569	0.00029
26	.01806	.05972	.10139	.14306	.18472	.22639	.00030
27	.01875	.06042	.10208	.14375	.18542	.22708	.00031
28	.01944	.06111	.10278	.14444	.18611	.22778	.00032
29	.02014	.06181	.10347	.14514	.18681	.22847	.00034
30	0.02083	0.06250	0.10417	0.14583	0.18750	0.22917	0.00035
31	.02153	.06319	.10486	.14653	.18819	.22986	.00036
32	.02222	.06389	.10556	.14722	.18889	.23056	.00037
33	.02292	.06458	.10625	.14792	.18958	.23125	.00038
34	.02361	.06528	.10694	.14861	.19028	.23194	.00039
35	0.02431	0.06597	0.10764	0.14931	0.19097	0.23264	0.00041
36	.02500	.06667	.10833	.15000	.19167	.23333	.00042
37	.02569	.06736	.10903	.15069	.19236	.23403	.00043
38	.02639	.06806	.10972	.15139	.19306	.23472	.00044
39	.02708	.06875	.11042	.15208	.19375	.23542	.00045
40	0.02778	0.06944	0.11111	0.15278	0.19444	0.23611	0.00046
41	.02847	.07014	.11181	.15347	.19514	.23681	.00047
42	.02917	.07083	.11250	.15417	.19583	.23750	.00049
43	.02986	.07153	.11319	.15486	.19653	.23819	.00050
44	.03056	.07222	.11389	.15556	.19722	.23889	.00051
45	0.03125	0.07292	0.11458	0.15625	0.19792	0.23958	0.00052
46	.03194	.07361	.11528	.15694	.19861	.24028	.00053
47	.03264	.07431	.11597	.15764	.19931	.24097	.00054
48	.03333	.07500	.11667	.15833	.20000	.24167	.00056
49	.03403	.07569	.11736	.15903	.20069	.24236	.00057
50	0.03472	0.07639	0.11806	0.15972	0.20139	0.24306	0.00058
51	.03542	.07708	.11875	.16042	.20208	.24375	.00059
52	.03611	.07778	.11944	.16111	.20278	.24444	.00060
53	.03681	.07847	.12014	.16181	.20347	.24514	.00061
54	.03750	.07917	.12083	.16250	.20417	.24583	.00062
55	0.03819	0.07986	0.12153	0.16319	0.20486	0.24653	0.00064
56	.03889	.08056	.12222	.16389	.20556	.24722	.00065
57	.03958	.08125	.12292	.16458	.20625	.24792	.00066
58	.04028	.08194	.12361	.16528	.20694	.24861	.00067
59	.04097	.08264	.12431	.16597	.20764	.24931	.00068

TABLE IX.

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CONVERSION OF HOURS, MINUTES AND SECONDS INTO DECIMALS
OF A DAY.

	6 ^h	7 ^h	8 ^h	9 ^h	10 ^h	11 ^h	SECONDS
m	d	d	d	d	d	d	s
0	0.25000	0.29167	0.33333	0.37500	0.41667	0.45833	0
1	.25009	.29236	.33403	.37569	.41736	.45903	1
2	.25139	.29306	.33472	.37639	.41806	.45972	2
3	.25208	.29375	.33542	.37708	.41875	.46042	3
4	.25278	.29444	.33611	.37778	.41944	.46111	4
5	0.25347	0.29514	0.33681	0.37847	0.42014	0.46181	5
6	.25417	.29583	.33750	.37917	.42083	.46250	6
7	.25486	.29653	.33819	.37986	.42153	.46319	7
8	.25556	.29722	.33889	.38056	.42222	.46389	8
9	.25625	.29792	.33958	.38125	.42292	.46458	9
10	0.25694	0.29861	0.34028	0.38194	0.42361	0.46528	10
11	.25764	.29931	.34097	.38264	.42431	.46597	11
12	.25833	.30000	.34167	.38333	.42500	.46667	12
13	.25903	.30069	.34236	.38403	.42569	.46736	13
14	.25972	.30139	.34306	.38472	.42639	.46806	14
15	0.26042	0.30208	0.34375	0.38542	0.42708	0.46875	15
16	.26111	.30278	.34444	.38611	.42778	.46944	16
17	.26181	.30347	.34514	.38681	.42847	.47014	17
18	.26250	.30417	.34583	.38750	.42917	.47083	18
19	.26319	.30486	.34653	.38819	.42986	.47153	19
20	0.26389	0.30556	0.34722	0.38889	0.43056	0.47222	20
21	.26458	.30625	.34792	.38958	.43125	.47292	21
22	.26528	.30694	.34861	.39028	.43194	.47361	22
23	.26597	.30764	.34931	.39097	.43264	.47431	23
24	.26667	.30833	.35000	.39167	.43333	.47500	24
25	0.26736	0.30903	0.35069	0.39236	0.43403	0.47569	25
26	.26806	.30972	.35139	.39306	.43472	.47639	26
27	.26875	.31042	.35208	.39375	.43542	.47708	27
28	.26944	.31111	.35278	.39444	.43611	.47778	28
29	.27014	.31181	.35347	.39514	.43681	.47847	29
30	0.27083	0.31250	0.35417	0.39583	0.43750	0.47917	30
31	.27153	.31319	.35486	.39653	.43819	.47986	31
32	.27222	.31389	.35556	.39722	.43889	.48056	32
33	.27292	.31458	.35625	.39792	.43958	.48125	33
34	.27361	.31528	.35694	.39861	.44028	.48194	34
35	0.27431	0.31597	0.35764	0.39931	0.44097	0.48264	35
36	.27500	.31667	.35833	.40000	.44167	.48333	36
37	.27569	.31736	.35903	.40069	.44236	.48403	37
38	.27639	.31806	.35972	.40139	.44306	.48472	38
39	.27708	.31875	.36042	.40208	.44375	.48542	39
40	0.27778	0.31944	0.36111	0.40278	0.44444	0.48611	40
41	.27847	.32014	.36181	.40347	.44514	.48681	41
42	.27917	.32083	.36250	.40417	.44583	.48750	42
43	.27986	.32153	.36319	.40486	.44653	.48819	43
44	.28056	.32222	.36389	.40556	.44722	.48889	44
45	0.28125	0.32292	0.36458	0.40625	0.44792	0.48958	45
46	.28194	.32361	.36528	.40694	.44861	.49028	46
47	.28264	.32431	.36597	.40764	.44931	.49097	47
48	.28333	.32500	.36667	.40833	.45000	.49167	48
49	.28403	.32569	.36736	.40903	.45069	.49236	49
50	0.28472	0.32639	0.36806	0.40972	0.45139	0.49306	50
51	.28542	.32708	.36875	.41042	.45208	.49375	51
52	.28611	.32778	.36944	.41111	.45278	.49444	52
53	.28681	.32847	.37014	.41181	.45347	.49514	53
54	.28750	.32917	.37083	.41250	.45417	.49583	54
55	0.28819	0.32986	0.37153	0.41319	0.45486	0.49653	55
56	.28889	.33056	.37222	.41389	.45556	.49722	56
57	.28958	.33125	.37292	.41458	.45625	.49792	57
58	.29028	.33194	.37361	.41528	.45694	.49861	58
59	.29097	.33264	.37431	.41597	.45764	.49931	59

FOR COMPUTING THE GEOCENTRIC CO-ORDINATES OF A PLACE.

ϕ	S	C	ϕ	S	C
$\pm 0^\circ$	0.993277	1.000000	$\pm 30^\circ$	0.994113	1.000841
1	.993278 + 1	.000001 + 1	31	.994164 + 51	.000893 + 52
2	.993281 3	.000004 3	32	.994216 52	.000945 52
3	.993286 5	.000009 5	33	.994269 53	.000999 54
4	.993294 9	.000016 10	34	.994323 54	.001053 54
5	0.993303	1.000026	35	0.994378	1.001108
6	.993314 + 11	.000037 + 11	36	.994433 + 55	.001163 + 55
7	.993327 13	.000050 13	37	.994489 56	.001220 57
8	.993342 15	.000065 15	38	.994545 56	.001277 57
9	.993359 17	.000082 17	39	.994602 57	.001334 57
10	.993378 19	.000101 19	40	.994660 58	.001392 58
11	.993399 + 21	.000122 + 21	41	.994717 + 57	.001450 + 58
12	.993422 23	.000145 23	42	.994776 59	.001508 58
13	.993446 24	.000170 25	43	.994834 58	.001567 59
14	.993473 27	.000197 28	44	.994892 58	.001626 59
15	0.993501	1.000225	45	0.994951	1.001685
16	.993531 + 30	.000255 + 30	46	.995009 + 58	.001744 + 59
17	.993563 32	.000287 32	47	.995068 59	.001803 59
18	.993596 33	.000321 34	48	.995126 58	.001862 59
19	.993631 35	.000356 35	49	.995185 59	.001920 58
20	0.993668	1.000393	50	0.995242	1.001978
21	.993706 + 38	.000432 + 39	51	.995300 + 58	.002036 + 58
22	.993746 40	.000472 40	52	.995357 57	.002094 58
23	.993787 41	.000514 42	53	.995414 57	.002151 57
24	.993830 43	.000557 43	54	.995470 56	.002207 56
25	0.993874	1.000601	55	0.995525	1.002263
26	.993920 + 46	.000647 + 46	56	.995580 + 55	.002318 + 55
27	.993966 46	.000694 47	57	.995634 54	.002373 55
28	.994014 48	.000742 48	58	.995687 53	.002426 53
29	.994063 49	.000791 49	59	.995740 53	.002479 53
$\pm 30^\circ$	0.994113	1.000841	$\pm 60^\circ$	0.995791	1.002531

Let ϕ = Geographical latitude ϕ' = Geocentric latitude ρ = Geocentric radius h = Altitude above sea level in metres H = Altitude above sea level in feet

Then—

$$\rho \sin \phi' = (S + 10^{-8} \cdot 0.1568h) \sin \phi$$

$$= (S + 10^{-8} \cdot 0.0478H) \sin \phi$$

$$\rho \cos \phi' = (C + 10^{-8} \cdot 0.1568h) \cos \phi$$

$$= (C + 10^{-8} \cdot 0.0478H) \cos \phi$$

$$\tan \phi' = (0.993277 + 10^{-8} \cdot 0.0011h) \tan \phi$$

$$= (0.993277 + 10^{-8} \cdot 0.0003H) \tan \phi$$

$$\frac{d \rho \sin \phi'}{d \phi} = S C^2 \cos \phi = S C \rho \cos \phi'$$

$$\frac{d \rho \cos \phi'}{d \phi} = -S C^2 \sin \phi = -C^2 \rho \sin \phi'$$

$$\frac{d \tan \phi'}{d \phi} = 0.9933 \sec^2 \phi$$

TABLE XI.

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FOR COMPUTING THE GEOCENTRIC CO-ORDINATES OF A PLACE.

ϕ	log S	log C	ϕ	log S	log C
± 0	9.997071 + 0	0.000000 + 0	± 30	9.997436 +22	0.000365 +23
1	.997071 1	.000000 2	31	.997458 23	.000388 22
2	.997072 3	.000002 2	32	.997481 23	.000410 22
3	.997075 3	.000004 3	33	.997504 23	.000433 23
4	.997078 4	.000007 4	34	.997527 24	.000457 24
5	9.997082 + 4	0.000011 + 5	35	9.997551 +24	0.000481 +24
6	.997086 6	.000016 6	36	.997575 25	.000505 24
7	.997092 7	.000022 6	37	.997600 25	.000529 25
8	.997099 7	.000028 8	38	.997625 24	.000554 25
9	.997106 9	.000036 8	39	.997649 26	.000579 25
10	9.997115 + 9	0.000044 + 9	40	9.997675 +25	0.000604 +25
11	.997124 10	.000053 10	41	.997700 25	.000629 26
12	.997134 10	.000063 11	42	.997725 26	.000655 25
13	.997144 12	.000074 11	43	.997751 25	.000680 26
14	.997156 12	.000085 13	44	.997776 26	.000706 25
15	9.997168 +13	0.000098 +13	45	9.997802 +25	0.000731 +26
16	.997181 14	.000111 14	46	.997827 26	.000757 25
17	.997195 15	.000125 14	47	.997853 25	.000782 26
18	.997210 15	.000139 16	48	.997878 26	.000808 25
19	.997225 16	.000155 16	49	.997904 25	.000833 25
20	9.997241 +17	0.000171 +17	50	9.997929 +25	0.000858 +25
21	.997258 17	.000188 17	51	.997954 25	.000883 25
22	.997275 19	.000205 18	52	.997979 25	.000908 25
23	.997294 18	.000223 19	53	.998004 24	.000933 25
24	.997312 19	.000242 19	54	.998028 24	.000958 24
25	9.997331 +20	0.000261 +20	55	9.998052 +24	0.000982 +24
26	.997351 21	.000281 20	56	.998076 24	.001006 23
27	.997372 21	.000301 21	57	.998100 23	.001029 23
28	.997393 21	.000322 21	58	.998123 23	.001052 23
29	.997414 22	.000343 22	59	.998146 22	.001075 23
± 30	9.997436	0.000365	± 60	9.998168	0.001098

Let ϕ = Geographical latitude ϕ' = Geocentric latitude ρ = Geocentric radius h = Altitude above sea level in metres H = Altitude above sea level in feet

Then—

 $\log \rho \sin \phi' = \log \sin \phi + \log S + f \times \text{altitude}$ $\log \rho \cos \phi' = \log \cos \phi + \log C + g \times \text{altitude}$ $\log \tan \phi' = \log \tan \phi + 9.997071 + 10^{-6} \times 0.0005h \text{ (or } 0.0001H)$

In units of 6th decimal. For altitude in—

Metres			Feet		Metres			Feet	
ϕ	f	g	f	g	ϕ	f	g	f	g
0°	0.0685	0.0681	0.0209	0.0208	30°	0.0685	0.0680	0.0209	0.0207
10	0.0685	0.0681	0.0209	0.0208	40	0.0685	0.0680	0.0209	0.0207
20	0.0685	0.0681	0.0209	0.0207	50	0.0684	0.0680	0.0209	0.0207
30	0.0685	0.0680	0.0209	0.0207	60	0.0684	0.0679	0.0208	0.0207

TABLE XII.

PRECESSION IN RIGHT ASCENSION AND DECLINATION.

p_a															p_δ
δ	α	0°	10°	20°	30°	40°	45°	50°	52°	54°	56°	58°	60°		
h m	h m	s	s	s	s	s	s	s	s	s	s	s	s	''	
0 00	12 00	3.07	3.07	3.07	3.07	3.07	3.07	3.07	3.07	3.07	3.07	3.07	3.07	20.0	
0 10	11 50	3.07	3.08	3.09	3.11	3.12	3.13	3.14	3.15	3.15	3.16	3.17	3.17	20.0	
0 20	11 40	3.07	3.09	3.12	3.14	3.17	3.19	3.21	3.22	3.23	3.25	3.26	3.27	20.0	
0 30	11 30	3.07	3.10	3.14	3.17	3.22	3.25	3.28	3.30	3.31	3.33	3.35	3.38	19.9	
0 40	11 20	3.07	3.11	3.16	3.21	3.27	3.31	3.35	3.37	3.39	3.42	3.44	3.47	19.7	
0 50	11 10	3.07	3.12	3.18	3.24	3.32	3.36	3.42	3.44	3.47	3.50	3.54	3.57	19.6	
1 00	11 00	3.07	3.13	3.20	3.27	3.36	3.42	3.49	3.52	3.55	3.59	3.63	3.67	19.4	
1 10	10 50	3.07	3.14	3.22	3.30	3.41	3.47	3.55	3.59	3.63	3.67	3.72	3.77	19.1	
1 20	10 40	3.07	3.15	3.24	3.34	3.46	3.53	3.62	3.66	3.70	3.75	3.80	3.86	18.8	
1 30	10 30	3.07	3.16	3.26	3.37	3.50	3.58	3.68	3.73	3.78	3.83	3.89	3.96	18.5	
1 40	10 20	3.07	3.17	3.28	3.40	3.55	3.64	3.75	3.80	3.85	3.91	3.98	4.05	18.2	
1 50	10 10	3.07	3.18	3.30	3.43	3.59	3.69	3.81	3.86	3.92	3.99	4.06	4.14	17.8	
2 00	10 00	3.07	3.19	3.32	3.46	3.63	3.74	3.87	3.93	3.99	4.06	4.14	4.23	17.4	
2 10	9 50	3.07	3.20	3.33	3.49	3.68	3.79	3.93	3.99	4.06	4.14	4.22	4.32	16.9	
2 20	9 40	3.07	3.21	3.35	3.52	3.72	3.84	3.99	4.05	4.13	4.21	4.30	4.40	16.4	
2 30	9 30	3.07	3.22	3.37	3.54	3.75	3.89	4.04	4.11	4.19	4.28	4.37	4.48	15.9	
2 40	9 20	3.07	3.22	3.39	3.57	3.79	3.93	4.10	4.17	4.26	4.35	4.45	4.56	15.4	
2 50	9 10	3.07	3.23	3.40	3.59	3.83	3.98	4.15	4.23	4.32	4.41	4.52	4.64	14.8	
3 00	9 00	3.07	3.24	3.42	3.62	3.87	4.02	4.20	4.28	4.37	4.47	4.59	4.71	14.2	
3 10	8 50	3.07	3.25	3.43	3.64	3.90	4.06	4.25	4.33	4.43	4.53	4.65	4.78	13.5	
3 20	8 40	3.07	3.25	3.45	3.66	3.93	4.10	4.29	4.38	4.48	4.59	4.71	4.85	12.9	
3 30	8 30	3.07	3.26	3.46	3.68	3.96	4.13	4.34	4.43	4.53	4.64	4.77	4.91	12.2	
3 40	8 20	3.07	3.27	3.47	3.70	3.99	4.17	4.38	4.47	4.58	4.70	4.82	4.97	11.5	
3 50	8 10	3.07	3.27	3.48	3.72	4.02	4.20	4.42	4.51	4.62	4.74	4.88	5.02	10.8	
4 00	8 00	3.07	3.28	3.49	3.74	4.04	4.23	4.45	4.55	4.67	4.79	4.93	5.08	10.0	
4 10	7 50	3.07	3.28	3.50	3.76	4.07	4.26	4.49	4.59	4.70	4.83	4.97	5.13	9.3	
4 20	7 40	3.07	3.29	3.51	3.77	4.09	4.28	4.52	4.62	4.74	4.87	5.01	5.17	8.5	
4 30	7 30	3.07	3.29	3.52	3.79	4.11	4.31	4.54	4.65	4.77	4.90	5.05	5.21	7.7	
4 40	7 20	3.07	3.29	3.53	3.80	4.13	4.33	4.57	4.68	4.80	4.93	5.08	5.25	6.9	
4 50	7 10	3.07	3.30	3.54	3.81	4.14	4.35	4.59	4.70	4.83	4.96	5.11	5.28	6.0	
5 00	7 00	3.07	3.30	3.54	3.82	4.16	4.36	4.61	4.72	4.85	4.99	5.14	5.31	5.2	
5 10	6 50	3.07	3.30	3.55	3.83	4.17	4.38	4.63	4.74	4.87	5.01	5.16	5.33	4.3	
5 20	6 40	3.07	3.31	3.55	3.83	4.18	4.39	4.64	4.76	4.88	5.02	5.18	5.35	3.5	
5 30	6 30	3.07	3.31	3.56	3.84	4.18	4.40	4.65	4.77	4.90	5.04	5.19	5.37	2.6	
5 40	6 20	3.07	3.31	3.56	3.84	4.19	4.40	4.66	4.78	4.91	5.05	5.20	5.38	1.8	
5 50	6 10	3.07	3.31	3.56	3.84	4.19	4.41	4.66	4.78	4.91	5.05	5.21	5.39	0.9	
6 00	6 00	3.07	3.31	3.56	3.84	4.19	4.41	4.67	4.78	4.91	5.05	5.21	5.39	0.0	

The above table is for northern declinations. For southern declinations use as argument $\alpha \pm 12^h$.

The table is based on the formulæ

$$p_a = 3^s.0730 + 1^s.3362 \sin \alpha \tan \delta$$

$$p_\delta = 20''.043 \cos \alpha$$

For more extended tables of precession in right ascension and declination the *Präcessions-Tafeln* of Richard Schorr, Director of the Hamburg Observatory in Bergedorf, may be consulted.

Sign
of p_δ

h
0
6
12
18
24
+
-
-
+

PRECESSION IN RIGHT ASCENSION AND DECLINATION.

p_a														p_δ
δ	0°	10°	20°	30°	40°	45°	50°	52°	54°	56°	58°	60°		
a	0°	10°	20°	30°	40°	45°	50°	52°	54°	56°	58°	60°		
h m	h m	s	s	s	s	s	s	s	s	s	s	s	s	"
12 00	24 00	3.07	3.07	3.07	3.07	3.07	3.07	3.07	3.07	3.07	3.07	3.07	3.07	20.0
12 10	23 50	3.07	3.06	3.05	3.04	3.02	3.01	3.00	3.00	2.99	2.99	2.98	2.97	20.0
12 20	23 40	3.07	3.05	3.03	3.01	2.98	2.96	2.93	2.92	2.91	2.90	2.89	2.87	20.0
12 30	23 30	3.07	3.04	3.01	2.97	2.93	2.90	2.87	2.85	2.83	2.81	2.79	2.77	19.9
12 40	23 20	3.07	3.03	2.99	2.94	2.88	2.84	2.80	2.78	2.75	2.73	2.70	2.67	19.7
12 50	23 10	3.07	3.02	2.97	2.91	2.83	2.78	2.73	2.70	2.67	2.64	2.61	2.57	19.6
13 00	23 00	3.07	3.01	2.95	2.87	2.78	2.73	2.66	2.63	2.60	2.56	2.52	2.47	19.4
13 10	22 50	3.07	3.00	2.93	2.84	2.74	2.67	2.59	2.56	2.52	2.48	2.43	2.38	19.1
13 20	22 40	3.07	2.99	2.91	2.81	2.69	2.62	2.53	2.49	2.44	2.40	2.34	2.28	18.8
13 30	22 30	3.07	2.98	2.89	2.78	2.64	2.56	2.46	2.42	2.37	2.32	2.25	2.19	18.5
13 40	22 20	3.07	2.97	2.87	2.75	2.60	2.51	2.40	2.35	2.30	2.24	2.17	2.09	18.2
13 50	22 10	3.07	2.96	2.85	2.72	2.56	2.47	2.34	2.28	2.22	2.16	2.08	2.00	17.8
14 00	22 00	3.07	2.96	2.83	2.69	2.51	2.40	2.28	2.22	2.15	2.08	2.00	1.92	17.4
14 10	21 50	3.07	2.95	2.81	2.66	2.47	2.35	2.22	2.15	2.08	2.01	1.92	1.83	16.9
14 20	21 40	3.07	2.94	2.79	2.63	2.43	2.31	2.16	2.09	2.02	1.94	1.85	1.75	16.4
14 30	21 30	3.07	2.93	2.78	2.60	2.39	2.26	2.10	2.03	1.95	1.87	1.77	1.66	15.9
14 40	21 20	3.07	2.92	2.76	2.58	2.35	2.21	2.05	1.97	1.89	1.80	1.70	1.59	15.4
14 50	21 10	3.07	2.91	2.74	2.55	2.32	2.17	2.00	1.92	1.83	1.73	1.63	1.51	14.8
15 00	21 00	3.07	2.91	2.73	2.53	2.28	2.13	1.95	1.86	1.77	1.67	1.56	1.44	14.2
15 10	20 50	3.07	2.90	2.71	2.50	2.25	2.09	1.90	1.81	1.72	1.61	1.50	1.37	13.5
15 20	20 40	3.07	2.89	2.70	2.48	2.21	2.05	1.85	1.76	1.66	1.56	1.44	1.30	12.9
15 30	20 30	3.07	2.89	2.69	2.46	2.18	2.01	1.81	1.72	1.61	1.50	1.38	1.24	12.2
15 40	20 20	3.07	2.88	2.67	2.44	2.15	1.98	1.77	1.67	1.57	1.45	1.32	1.18	11.5
15 50	20 10	3.07	2.87	2.66	2.42	2.13	1.95	1.73	1.63	1.52	1.40	1.27	1.12	10.8
16 00	20 00	3.07	2.87	2.65	2.40	2.10	1.92	1.69	1.59	1.48	1.36	1.22	1.07	10.0
16 10	19 50	3.07	2.86	2.64	2.39	2.08	1.89	1.66	1.56	1.44	1.32	1.18	1.02	9.3
16 20	19 40	3.07	2.86	2.63	2.37	2.06	1.86	1.63	1.52	1.41	1.28	1.14	0.98	8.5
16 30	19 30	3.07	2.86	2.62	2.36	2.04	1.84	1.60	1.49	1.37	1.24	1.10	0.93	7.7
16 40	19 20	3.07	2.85	2.62	2.35	2.02	1.82	1.58	1.47	1.34	1.21	1.06	0.90	6.9
16 50	19 10	3.07	2.85	2.61	2.34	2.00	1.80	1.55	1.44	1.32	1.18	1.03	0.87	6.0
17 00	19 00	3.07	2.85	2.60	2.33	1.99	1.78	1.53	1.42	1.30	1.16	1.01	0.84	5.2
17 10	18 50	3.07	2.84	2.60	2.32	1.98	1.77	1.52	1.40	1.28	1.14	0.99	0.81	4.3
17 20	18 40	3.07	2.84	2.59	2.31	1.97	1.76	1.50	1.39	1.26	1.12	0.97	0.79	3.5
17 30	18 30	3.07	2.84	2.59	2.31	1.96	1.75	1.49	1.38	1.25	1.11	0.95	0.78	2.6
17 40	18 20	3.07	2.84	2.59	2.30	1.96	1.74	1.49	1.37	1.24	1.10	0.94	0.77	1.8
17 50	18 10	3.07	2.84	2.59	2.30	1.95	1.74	1.48	1.36	1.24	1.09	0.94	0.76	0.9
18 00	18 00	3.07	2.84	2.59	2.30	1.95	1.74	1.48	1.36	1.23	1.09	0.93	0.76	0.0

The above table is for northern declinations. For southern declinations use as argument $a \pm 12^h$.

The table is based on the formulæ

$$p_a = 3^s.0730 + 1^s.3362 \sin a \tan \delta$$

$$p_\delta = 20''.043 \cos a$$

For more extended tables of precession in right ascension and declination the *Präzessions-Tafeln* of Richard Schorr, Director of the Hamburg Observatory in Bergedorf, may be consulted.

Sign
of p_δ

h
o
+
6
-
12
-
18
+
24

REDUCTION OF STAR POSITIONS FROM THE MEAN EQUINOX
OF 1931.0 TO THE STANDARD EQUINOX OF 1950.0.

α	$0^h, 12^h$		$1^h, 13^h$		$2^h, 14^h$		$3^h, 15^h$		$4^h, 16^h$		$5^h, 17^h$	
	$+A_1-$	$+D-$	$+A_1-$	$+D-$	$+A_1-$	$+D-$	$+A_1-$	$+D-$	$+A_1-$	$+D-$	$+A_1-$	$+D-$
0	0°054	6 20°82	6°623	6 07°64	12°741	5 29°40	17°990	4 28°71	22°014	3 09°71	24°537	1 37°78
1	0°165	6 20°82	6°730	6 07°20	12°837	5 28°56	18°068	4 27°53	22°069	3 08°27	24°565	1 36°18
2	0°275	6 20°80	6°837	6 06°76	12°932	5 27°72	18°146	4 26°35	22°123	3 06°82	24°593	1 34°57
3	0°386	6 20°78	6°943	6 06°31	13°027	5 26°87	18°223	4 25°16	22°177	3 05°37	24°620	1 32°96
4	0°497	6 20°75	7°050	6 05°85	13°122	5 26°01	18°300	4 23°96	22°231	3 03°92	24°647	1 31°34
5	0°608	6 20°71	7°156	6 05°38	13°217	5 25°15	18°377	4 22°76	22°284	3 02°46	24°673	1 29°73
6	0°718	6 20°67	7°262	6 04°91	13°311	5 24°28	18°453	4 21°56	22°337	3 01°00	24°699	1 28°12
7	0°829	6 20°62	7°368	6 04°43	13°405	5 23°41	18°529	4 20°35	22°390	2 59°54	24°725	1 26°50
8	0°940	6 20°56	7°474	6 03°95	13°499	5 22°53	18°605	4 19°13	22°443	2 58°07	24°750	1 24°88
9	1°050	6 20°50	7°580	6 03°46	13°593	5 21°64	18°680	4 17°91	22°496	2 56°60	24°774	1 23°26
10	1°161	6 20°42	7°686	6 02°96	13°687	5 20°75	18°755	4 16°68	22°544	2 55°13	24°798	1 21°64
11	1°272	6 20°34	7°791	6 02°45	13°780	5 19°85	18°829	4 15°45	22°595	2 53°65	24°822	1 20°01
12	1°382	6 20°26	7°897	6 01°94	13°873	5 18°95	18°903	4 14°22	22°645	2 52°17	24°845	1 18°36
13	1°493	6 20°16	8°002	6 01°42	13°965	5 18°04	18°977	4 12°98	22°695	2 50°69	24°867	1 16°76
14	1°604	6 20°06	8°107	6 00°89	14°058	5 17°12	19°050	4 11°74	22°745	2 49°20	24°889	1 15°15
15	1°714	6 19°55	8°212	6 00°35	14°150	5 16°20	19°123	4 10°49	22°794	2 47°71	24°911	1 13°56
16	1°825	6 19°44	8°317	5 59°81	14°242	5 15°27	19°196	4 09°23	22°842	2 46°22	24°932	1 11°87
17	1°935	6 19°32	8°421	5 59°26	14°333	5 14°33	19°268	4 07°97	22°890	2 44°72	24°953	1 10°28
18	2°046	6 19°19	8°526	5 58°71	14°424	5 13°39	19°340	4 06°71	22°938	2 43°22	24°973	1 08°66
19	2°156	6 19°05	8°630	5 58°15	14°515	5 12°44	19°412	4 05°44	22°985	2 41°72	24°993	1 06°97
20	2°266	6 19°30	8°734	5 57°58	14°606	5 11°49	19°483	4 04°17	23°032	2 40°21	25°012	1 05°37
21	2°377	6 19°15	8°838	5 57°01	14°697	5 10°53	19°554	4 02°89	23°079	2 38°70	25°031	1 03°77
22	2°487	6 18°99	8°942	5 56°42	14°787	5 09°56	19°625	4 01°61	23°125	2 37°19	25°049	1 02°18
23	2°597	6 18°83	9°045	5 55°84	14°877	5 08°59	19°695	4 00°32	23°170	2 35°67	25°067	1 00°44
24	2°707	6 18°65	9°149	5 55°24	14°966	5 07°62	19°764	3 59°03	23°215	2 34°16	25°084	0 58°77
25	2°817	6 18°47	9°252	5 54°64	15°056	5 06°64	19°834	3 57°73	23°260	2 32°64	25°101	0 57°17
26	2°927	6 18°28	9°355	5 54°03	15°145	5 05°65	19°903	3 56°43	23°304	2 31°11	25°117	0 55°44
27	3°037	6 18°09	9°458	5 53°41	15°234	5 04°65	19°971	3 55°13	23°348	2 29°58	25°133	0 53°88
28	3°147	6 17°89	9°560	5 52°79	15°322	5 03°65	20°039	3 53°82	23°391	2 28°05	25°149	0 52°22
29	3°257	6 17°68	9°663	5 52°16	15°410	5 02°65	20°107	3 52°51	23°434	2 26°52	25°164	0 50°50
30	3°367	6 17°46	9°765	5 51°53	15°498	5 01°64	20°175	3 51°19	23°476	2 24°99	25°178	0 48°97
31	3°477	6 17°23	9°868	5 50°88	15°586	5 00°62	20°242	3 49°87	23°518	2 23°45	25°192	0 47°22
32	3°587	6 17°00	9°970	5 50°23	15°673	4 59°59	20°308	3 48°54	23°560	2 21°91	25°206	0 45°66
33	3°696	6 16°77	10°071	5 49°58	15°760	4 58°57	20°375	3 47°21	23°601	2 20°37	25°219	0 43°99
34	3°806	6 16°52	10°173	5 48°92	15°847	4 57°53	20°441	3 45°87	23°641	2 18°82	25°231	0 42°33
35	3°915	6 16°27	10°274	5 48°25	15°933	4 56°49	20°506	3 44°53	23°681	2 17°27	25°243	0 40°66
36	4°025	6 16°01	10°375	5 47°57	16°019	4 55°45	20°571	3 43°19	23°721	2 15°72	25°255	0 39°00
37	4°134	6 15°74	10°476	5 46°89	16°105	4 54°40	20°636	3 41°84	23°760	2 14°17	25°266	0 37°33
38	4°243	6 15°47	10°577	5 46°20	16°190	4 53°34	20°700	3 40°49	23°799	2 12°61	25°277	0 35°66
39	4°353	6 15°19	10°678	5 45°50	16°276	4 52°28	20°764	3 39°13	23°838	2 11°05	25°287	0 34°00
40	4°462	6 14°90	10°778	5 44°80	16°361	4 51°21	20°828	3 37°77	23°876	2 09°49	25°296	0 32°33
41	4°571	6 14°60	10°878	5 44°09	16°445	4 50°13	20°891	3 36°40	23°913	2 07°93	25°305	0 30°77
42	4°680	6 14°30	10°978	5 43°38	16°529	4 49°05	20°954	3 35°03	23°950	2 06°36	25°314	0 29°00
43	4°789	6 13°99	11°078	5 42°66	16°613	4 47°97	21°016	3 33°66	23°987	2 04°79	25°322	0 27°44
44	4°897	6 13°67	11°178	5 41°93	16°697	4 46°88	21°078	3 32°28	24°023	2 03°22	25°330	0 25°77
45	5°006	6 13°35	11°277	5 41°19	16°780	4 45°78	21°139	3 30°90	24°058	2 01°65	25°337	0 24°11
46	5°114	6 13°02	11°376	5 40°45	16°863	4 44°68	21°201	3 29°52	24°093	2 00°07	25°344	0 22°44
47	5°223	6 12°68	11°475	5 39°70	16°946	4 43°58	21°261	3 28°13	24°128	1 58°49	25°350	0 20°77
48	5°331	6 12°33	11°574	5 38°95	17°028	4 42°47	21°322	3 26°74	24°162	1 56°91	25°356	0 19°11
49	5°439	6 11°98	11°672	5 38°19	17°110	4 41°35	21°382	3 25°34	24°196	1 55°33	25°362	0 17°44
50	5°548	6 11°62	11°771	5 37°42	17°192	4 40°23	21°441	3 23°94	24°229	1 53°75	25°366	0 15°88
51	5°656	6 11°25	11°869	5 36°65	17°273	4 39°10	21°500	3 22°53	24°262	1 52°16	25°371	0 14°11
52	5°764	6 10°88	11°967	5 35°87	17°354	4 37°97	21°559	3 21°12	24°295	1 50°57	25°375	0 12°44
53	5°871	6 10°50	12°064	5 35°08	17°435	4 36°83	21°617	3 19°71	24°327	1 48°98	25°378	0 10°88
54	5°979	6 10°11	12°162	5 34°29	17°515	4 35°68	21°675	3 18°29	24°358	1 47°38	25°381	0 09°11
55	6°087	6 09°72	12°259	5 33°49	17°595	4 34°53	21°733	3 16°87	24°389	1 45°79	25°383	0 07°55
56	6°194	6 09°32	12°356	5 32°68	17°675	4 33°38	21°790	3 15°45	24°420	1 44°19	25°385	0 05°88
57	6°302	6 08°91	12°452	5 31°87	17°754	4 32°22	21°846	3 14°02	24°450	1 42°59	25°387	0 04°11
58	6°409	6 08°49	12°549	5 31°05	17°833	4 31°06	21°903	3 12°59	24°479	1 40°99	25°388	0 02°55
59	6°516	6 08°07	12°645	5 30°23	17°912	4 29°89	21°958	3 11°15	24°508	1 39°39	25°388	0 00°88
60	6°623	6 07°64	12°741	5 29°40	17°990	4 28°71	22°014	3 09°71	24°537	1 37°78	25°388	

TABLE XIII, 1931.

723

REDUCTION OF STAR POSITIONS FROM THE MEAN EQUINOX
OF 1931.0 TO THE STANDARD EQUINOX OF 1950.0.

α	$6^h, 18^h$		$7^h, 19^h$		$8^h, 20^h$		$9^h, 21^h$		$10^h, 22^h$		$11^h, 23^h$	
	$+A_1-$	$-D+$	$+A_1-$	$-D+$	$+A_1-$	$-D+$	$+A_1-$	$-D+$	$+A_1-$	$-D+$	$+A_1-$	$-D+$
m												
0	25 ^s 388	0 00 ^m 81	24 ^s 509	1 39 ^m 34	21 ^s 960	3 11 ^m 11	17 ^s 914	4 29 ^m 85	12 ^s 647	5 30 ^m 21	6 ^s 519	6 08 ^m 06
1	25 ^s 388	0 02 ^m 47	24 ^s 480	1 40 ^m 95	21 ^s 904	3 12 ^m 55	17 ^s 835	4 31 ^m 02	12 ^s 551	5 31 ^m 03	6 ^s 412	6 08 ^m 48
2	25 ^s 387	0 04 ^m 13	24 ^s 450	1 42 ^m 55	21 ^s 848	3 13 ^m 98	17 ^s 756	4 32 ^m 19	12 ^s 455	5 31 ^m 85	6 ^s 304	6 08 ^m 90
3	25 ^s 385	0 05 ^m 79	24 ^s 420	1 44 ^m 15	21 ^s 791	3 15 ^m 41	17 ^s 677	4 33 ^m 35	12 ^s 358	5 32 ^m 66	6 ^s 197	6 09 ^m 31
4	25 ^s 383	0 07 ^m 45	24 ^s 390	1 45 ^m 75	21 ^s 734	3 16 ^m 83	17 ^s 597	4 34 ^m 50	12 ^s 261	5 33 ^m 47	6 ^s 090	6 09 ^m 71
5	25 ^s 381	0 09 ^m 12	24 ^s 359	1 47 ^m 34	21 ^s 677	3 18 ^m 25	17 ^s 517	4 35 ^m 65	12 ^s 164	5 34 ^m 27	5 ^s 982	6 10 ^m 10
6	25 ^s 378	0 10 ^m 78	24 ^s 327	1 48 ^m 94	21 ^s 619	3 19 ^m 67	17 ^s 437	4 36 ^m 80	12 ^s 067	5 35 ^m 06	5 ^s 874	6 10 ^m 49
7	25 ^s 375	0 12 ^m 44	24 ^s 295	1 50 ^m 53	21 ^s 561	3 21 ^m 08	17 ^s 356	4 37 ^m 93	11 ^s 969	5 35 ^m 85	5 ^s 767	6 10 ^m 87
8	25 ^s 371	0 14 ^m 10	24 ^s 263	1 52 ^m 12	21 ^s 502	3 22 ^m 49	17 ^s 275	4 39 ^m 07	11 ^s 871	5 36 ^m 63	5 ^s 659	6 11 ^m 24
9	25 ^s 366	0 15 ^m 76	24 ^s 230	1 53 ^m 70	21 ^s 443	3 23 ^m 90	17 ^s 194	4 40 ^m 20	11 ^s 773	5 37 ^m 40	5 ^s 551	6 11 ^m 61
10	25 ^s 362	0 17 ^m 42	24 ^s 197	1 55 ^m 29	21 ^s 383	3 25 ^m 30	17 ^s 112	4 41 ^m 32	11 ^s 675	5 38 ^m 17	5 ^s 442	6 11 ^m 97
11	25 ^s 356	0 19 ^m 08	24 ^s 163	1 56 ^m 87	21 ^s 323	3 26 ^m 70	17 ^s 030	4 42 ^m 44	11 ^s 577	5 38 ^m 93	5 ^s 334	6 12 ^m 32
12	25 ^s 350	0 20 ^m 74	24 ^s 129	1 58 ^m 45	21 ^s 263	3 28 ^m 09	16 ^s 948	4 43 ^m 55	11 ^s 478	5 39 ^m 68	5 ^s 226	6 12 ^m 67
13	25 ^s 344	0 22 ^m 40	24 ^s 094	2 00 ^m 03	21 ^s 202	3 29 ^m 48	16 ^s 865	4 44 ^m 65	11 ^s 379	5 40 ^m 43	5 ^s 117	6 13 ^m 01
14	25 ^s 337	0 24 ^m 06	24 ^s 059	2 01 ^m 60	21 ^s 141	3 30 ^m 87	16 ^s 782	4 45 ^m 75	11 ^s 280	5 41 ^m 17	5 ^s 009	6 13 ^m 34
15	25 ^s 330	0 25 ^m 71	24 ^s 024	2 03 ^m 18	21 ^s 080	3 32 ^m 25	16 ^s 699	4 46 ^s 85	11 ^s 181	5 41 ^m 91	4 ^s 900	6 13 ^m 66
16	25 ^s 323	0 27 ^m 37	23 ^s 988	2 04 ^m 75	21 ^s 018	3 33 ^m 62	16 ^s 616	4 47 ^m 94	11 ^s 081	5 42 ^m 64	4 ^s 791	6 13 ^m 98
17	25 ^s 314	0 29 ^m 03	23 ^s 951	2 06 ^m 32	20 ^s 955	3 35 ^m 00	16 ^s 532	4 49 ^m 03	10 ^s 981	5 43 ^m 36	4 ^s 683	6 14 ^m 29
18	25 ^s 306	0 30 ^m 68	23 ^s 914	2 07 ^m 88	20 ^s 893	3 36 ^m 37	16 ^s 447	4 50 ^m 11	10 ^s 881	5 44 ^m 07	4 ^s 574	6 14 ^m 59
19	25 ^s 297	0 32 ^m 34	23 ^s 877	2 09 ^m 45	20 ^s 829	3 37 ^m 73	16 ^s 363	4 51 ^m 18	10 ^s 781	5 44 ^m 78	4 ^s 465	6 14 ^m 89
20	25 ^s 287	0 34 ^m 00	23 ^s 839	2 11 ^m 01	20 ^s 766	3 39 ^m 09	16 ^s 278	4 52 ^m 25	10 ^s 681	5 45 ^m 48	4 ^s 356	6 15 ^m 18
21	25 ^s 277	0 35 ^m 65	23 ^s 800	2 12 ^m 57	20 ^s 702	3 40 ^m 45	16 ^s 193	4 53 ^m 31	10 ^s 580	5 46 ^m 18	4 ^s 246	6 15 ^m 46
22	25 ^s 266	0 37 ^m 30	23 ^s 762	2 14 ^m 12	20 ^s 638	3 41 ^m 80	16 ^s 107	4 54 ^m 37	10 ^s 479	5 46 ^m 87	4 ^s 137	6 15 ^m 73
23	25 ^s 255	0 38 ^m 96	23 ^s 722	2 15 ^m 68	20 ^s 573	3 43 ^m 15	16 ^s 021	4 55 ^m 42	10 ^s 378	5 47 ^m 55	4 ^s 028	6 16 ^m 00
24	25 ^s 243	0 40 ^m 61	23 ^s 683	2 17 ^m 23	20 ^s 508	3 44 ^m 49	15 ^s 935	4 56 ^m 46	10 ^s 277	5 48 ^m 23	3 ^s 918	6 16 ^m 26
25	25 ^s 231	0 42 ^m 26	23 ^s 643	2 18 ^m 78	20 ^s 442	3 45 ^m 83	15 ^s 849	4 57 ^m 50	10 ^s 176	5 48 ^m 90	3 ^s 809	6 16 ^m 51
26	25 ^s 219	0 43 ^m 91	23 ^s 602	2 20 ^m 32	20 ^s 376	3 47 ^m 17	15 ^s 762	4 58 ^m 54	10 ^s 074	5 49 ^m 56	3 ^s 699	6 16 ^m 76
27	25 ^s 205	0 45 ^m 56	23 ^s 561	2 21 ^m 87	20 ^s 310	3 48 ^m 50	15 ^s 675	4 59 ^m 57	9 ^s 972	5 50 ^m 22	3 ^s 590	6 17 ^m 00
28	25 ^s 192	0 47 ^m 21	23 ^s 519	2 23 ^m 41	20 ^s 243	3 49 ^m 83	15 ^s 588	5 00 ^m 59	9 ^s 870	5 50 ^m 87	3 ^s 480	6 17 ^m 23
29	25 ^s 178	0 48 ^m 86	23 ^s 477	2 24 ^m 95	20 ^s 176	3 51 ^m 15	15 ^s 501	5 01 ^m 61	9 ^s 768	5 51 ^m 51	3 ^s 370	6 17 ^m 45
30	25 ^s 164	0 50 ^m 51	23 ^s 435	2 26 ^m 48	20 ^s 109	3 52 ^m 47	15 ^s 413	5 02 ^m 62	9 ^s 666	5 52 ^m 14	3 ^s 260	6 17 ^m 67
31	25 ^s 149	0 52 ^m 15	23 ^s 392	2 28 ^m 01	20 ^s 041	3 53 ^m 78	15 ^s 324	5 03 ^m 62	9 ^s 563	5 52 ^m 77	3 ^s 150	6 17 ^m 88
32	25 ^s 134	0 53 ^m 80	23 ^s 349	2 29 ^m 54	19 ^s 973	3 55 ^m 09	15 ^s 236	5 04 ^m 62	9 ^s 461	5 53 ^m 40	3 ^s 040	6 18 ^m 08
33	25 ^s 118	0 55 ^m 44	23 ^s 305	2 31 ^m 07	19 ^s 904	3 56 ^m 40	15 ^s 147	5 05 ^m 62	9 ^s 358	5 54 ^m 01	2 ^s 930	6 18 ^m 28
34	25 ^s 101	0 57 ^m 09	23 ^s 261	2 32 ^m 59	19 ^s 835	3 57 ^m 70	15 ^s 058	5 06 ^m 61	9 ^s 255	5 54 ^m 62	2 ^s 820	6 18 ^m 47
35	25 ^s 084	0 58 ^m 73	23 ^s 216	2 34 ^m 11	19 ^s 766	3 59 ^m 00	14 ^s 969	5 07 ^m 59	9 ^s 151	5 55 ^m 22	2 ^s 710	6 18 ^m 65
36	25 ^s 067	1 00 ^m 37	23 ^s 171	2 35 ^m 63	19 ^s 696	4 00 ^m 29	14 ^s 879	5 08 ^m 57	9 ^s 048	5 55 ^m 82	2 ^s 600	6 18 ^m 82
37	25 ^s 049	1 02 ^m 01	23 ^s 126	2 37 ^m 15	19 ^s 626	4 01 ^m 57	14 ^s 789	5 09 ^m 54	8 ^s 944	5 56 ^m 41	2 ^s 490	6 18 ^m 99
38	25 ^s 031	1 03 ^m 65	23 ^s 080	2 38 ^m 66	19 ^s 556	4 02 ^m 86	14 ^s 699	5 10 ^m 50	8 ^s 841	5 56 ^m 99	2 ^s 380	6 19 ^m 15
39	25 ^s 012	1 05 ^m 29	23 ^s 034	2 40 ^m 17	19 ^s 485	4 04 ^m 14	14 ^s 609	5 11 ^m 46	8 ^s 737	5 57 ^m 57	2 ^s 269	6 19 ^m 30
40	24 ^s 993	1 06 ^m 93	22 ^s 987	2 41 ^m 67	19 ^s 414	4 05 ^m 41	14 ^s 518	5 12 ^m 42	8 ^s 633	5 58 ^m 13	2 ^s 159	6 19 ^m 44
41	24 ^s 973	1 08 ^m 56	22 ^s 939	2 43 ^m 18	19 ^s 342	4 06 ^m 68	14 ^s 427	5 13 ^m 36	8 ^s 528	5 58 ^m 69	2 ^s 049	6 19 ^m 58
42	24 ^s 953	1 10 ^m 20	22 ^s 892	2 44 ^m 68	19 ^s 270	4 07 ^m 94	14 ^s 336	5 14 ^m 30	8 ^s 424	5 59 ^m 25	1 ^s 938	6 19 ^m 71
43	24 ^s 933	1 11 ^m 83	22 ^s 844	2 46 ^m 17	19 ^s 198	4 09 ^m 20	14 ^s 244	5 15 ^m 24	8 ^s 319	5 59 ^m 80	1 ^s 828	6 19 ^m 84
44	24 ^s 912	1 13 ^m 46	22 ^s 795	2 47 ^m 67	19 ^s 125	4 10 ^m 45	14 ^s 152	5 16 ^m 17	8 ^s 215	6 00 ^m 34	1 ^s 717	6 19 ^m 95
45	24 ^s 890	1 15 ^m 09	22 ^s 746	2 49 ^m 16	19 ^s 052	4 11 ^m 70	14 ^s 060	5 17 ^m 09	8 ^s 110	6 00 ^m 87	1 ^s 607	6 20 ^m 06
46	24 ^s 868	1 16 ^m 72	22 ^s 697	2 50 ^m 65	18 ^s 979	4 12 ^m 95	13 ^s 968	5 18 ^m 01	8 ^s 005	6 01 ^m 40	1 ^s 496	6 20 ^m 16
47	24 ^s 845	1 18 ^m 34	22 ^s 647	2 52 ^m 13	18 ^s 905	4 14 ^m 19	13 ^s 875	5 18 ^m 92	7 ^s 900	6 01 ^m 92	1 ^s 385	6 20 ^m 26
48	24 ^s 822	1 19 ^m 97	22 ^s 597	2 53 ^m 61	18 ^s 831	4 15 ^m 42	13 ^s 782	5 19 ^m 82	7 ^s 794	6 02 ^m 43	1 ^s 275	6 20 ^m 34
49	24 ^s 799	1 21 ^m 59	22 ^s 546	2 55 ^m 09	18 ^s 757	4 16 ^m 65	13 ^s 689	5 20 ^m 72	7 ^s 689	6 02 ^m 94	1 ^s 164	6 20 ^m 42
50	24 ^s 775	1 23 ^m 21	22 ^s 495	2 56 ^m 56	18 ^s 682	4 17 ^m 88	13 ^s 596	5 21 ^m 62	7 ^s 583	6 03 ^m 44	1 ^s 054	6 20 ^m 50
51	24 ^s 750	1 24 ^m 83	22 ^s 443	2 58 ^m 03	18 ^s 607	4 19 ^m 10	13 ^s 502	5 22 ^m 50	7 ^s 477	6 03 ^m 93	0 ^s 943	6 20 ^m 56
52	24 ^s 725	1 26 ^m 45	22 ^s 391	2 59 ^m 50	18 ^s 531	4 20 ^m 31	13 ^s 408	5 23 ^m 38	7 ^s 371	6 04 ^m 42	0 ^s 832	6 20 ^m 62
53	24 ^s 700	1 28 ^m 07	22 ^s 339	3 00 ^m 96	18 ^s 455	4 21 ^m 52	13 ^s 314	5 24 ^m 26	7 ^s 265	6 04 ^m 90	0 ^s 721	6 20 ^m 67
54	24 ^s 674	1 29 ^m 69	22 ^s 286	3 02 ^m 42	18 ^s 379	4 22 ^m 73	13 ^s 219	5 25 ^m 13	7 ^s 159	6 05 ^m 37	0 ^s 611	6 20 ^m 71
55	24 ^s 648	1 31 ^m 30	22 ^s 232	3 03 ^m 88	18 ^s 302	4 23 ^m 93	13 ^s 125	5 25 ^m 99	7 ^s 053	6 05 ^m 84	0 ^s 500	6 20 ^m 75
56	24 ^s 621	1 32 ^m 91	22 ^s 179	3 05 ^m 33	18 ^s 225	4 25 ^m 12	13 ^s					

TABLE XIV, 1931.

REDUCTION OF STAR POSITIONS FROM THE MEAN
EQUINOX OF 1931.0 TO THE STANDARD EQUINOX OF 1950.0.

α	A	A_z	D_1	α	α	A	A_z	D_1	α
$^h \ m$	s	s	$''$	$^h \ m$	$^h \ m$	s	s	$''$	$^h \ m$
0 00	+58.389	+0.000	-0.00	12 00	6 00	+58.389	-0.000	-0.35	18 00
10	.390	.002	.00	10	10	.388	.002	.35	10
20	.391	.004	.00	20	20	.387	.004	.35	20
30	.392	.006	.01	30	30	.386	.006	.35	30
40	.393	.008	.01	40	40	.385	.008	.34	40
50	.394	.010	.02	50	50	.384	.010	.34	50
1 00	+58.395	+0.012	-0.02	13 00	7 00	+58.383	-0.012	-0.33	19 00
10	.395	.013	.03	10	10	.382	.013	.32	10
20	.396	.015	.04	20	20	.381	.015	.31	20
30	.397	.017	.05	30	30	.380	.017	.30	30
40	.398	.018	.06	40	40	.380	.018	.29	40
50	.398	.019	.08	50	50	.379	.019	.28	50
2 00	+58.399	+0.020	-0.09	14 00	8 00	+58.378	-0.020	-0.26	20 00
10	.399	.021	.10	10	10	.378	.021	.25	10
20	.400	.022	.12	20	20	.378	.022	.24	20
30	.400	.023	.13	30	30	.377	.023	.22	30
40	.400	.023	.15	40	40	.377	.023	.20	40
50	.400	.023	.16	50	50	.377	.023	.19	50
3 00	+58.400	+0.023	-0.18	15 00	9 00	+58.377	-0.023	-0.17	21 00
10	.400	.023	.19	10	10	.377	.023	.16	10
20	.400	.023	.21	20	20	.377	.023	.14	20
30	.400	.023	.22	30	30	.377	.023	.13	30
40	.400	.022	.24	40	40	.378	.022	.11	40
50	.399	.021	.25	50	50	.378	.021	.10	50
4 00	+58.399	+0.020	-0.26	16 00	10 00	+58.379	-0.020	-0.09	22 00
10	.398	.019	.28	10	10	.379	.019	.07	10
20	.398	.018	.29	20	20	.380	.018	.06	20
30	.397	.016	.30	30	30	.380	.016	.05	30
40	.396	.015	.31	40	40	.381	.015	.04	40
50	.395	.013	.32	50	50	.382	.013	.03	50
5 00	+58.395	+0.012	-0.33	17 00	11 00	+58.383	-0.012	-0.02	23 00
10	.394	.010	.34	10	10	.384	.010	.02	10
20	.393	.008	.34	20	20	.385	.008	.01	20
30	.392	.006	.35	30	30	.386	.006	.01	30
40	.391	.004	.35	40	40	.387	.004	.00	40
50	.390	+0.002	.35	50	50	.388	-0.002	-0.00	50
6 00	+58.389	0.000	-0.35	18 00	12 00	+58.389	0.000	0.00	24 00

$$\alpha_{1950} = \alpha_{1931} + A + A_1 \tan \delta_{1931} + A_z \tan^2 \delta_{1931}$$

$$\delta_{1950} = \delta_{1931} + D + D_1 \tan \delta_{1931}$$

A_1 and D are taken from Table XIII with argument α_{1931} . For values of the argument between 0^h and 12^h the sign on the left is to be taken, and for values between 12^h and 24^h the sign on the right.

Using accents to denote quantities taken from these tables with argument $24^h - \alpha_{1950}$

$$\alpha_{1931} = \alpha_{1950} - A' + A'_1 \tan \delta_{1950} - A'_z \tan^2 \delta_{1950}$$

$$\delta_{1931} = \delta_{1950} - D' + D'_1 \tan \delta_{1950}$$

TABLE XV, 1931.

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FOR REDUCTION FROM THE STANDARD EQUINOX OF 1950.0
TO THE TRUE EQUINOX OF DATE.

δ	$4 \tan \delta$	Date	f	g	G	Date	f	g	G
0	0.00	Jan. -5	-58.8	6.39	12 04	July 6	-57.0	6.19	12 05
1	0.07	3	58.7	6.38	04	14	56.9	6.18	05
2	0.14	11	58.6	6.37	04	22	56.8	6.18	05
3	0.21	19*	58.5	6.36	05	30	56.7	6.17	05
4	0.28	27	58.4	6.35	05	Aug. 7*	56.6	6.16	05
5	0.35	Feb. 4	-58.3	6.34	12 05	15	-56.6	6.15	12 05
6	0.42	12	58.3	6.34	05	23	56.5	6.14	05
7	0.49	20	58.2	6.33	05	31	56.4	6.14	05
8	0.56	28*	58.1	6.32	05	Sept. 8	56.4	6.13	05
9	0.63	Mar. 8	58.1	6.31	05	16*	56.3	6.12	05
10	0.71	16	-58.0	6.31	12 05	24	-56.3	6.12	12 06
11	0.78	24	58.0	6.30	05	Oct. 2	56.2	6.11	06
12	0.85	Apr. 1	57.9	6.30	05	10	56.2	6.10	06
13	0.92	9*	57.9	6.29	05	18	56.1	6.10	05
14	1.00	17	57.8	6.28	05	26*	56.0	6.09	05
15	1.07	25	-57.7	6.28	12 05	Nov. 3	-56.0	6.08	12 05
16	1.15	May 3	57.7	6.27	05	11	55.9	6.07	05
17	1.22	11	57.6	6.26	05	19	55.8	6.07	05
18	1.30	19*	57.5	6.25	05	27	55.7	6.06	05
19	1.38	27	57.4	6.24	05	Dec. 5*	55.6	6.05	05
20	1.46	June 4	-57.3	6.23	12 05	13	-55.5	6.04	12 05
21	1.54	12	57.2	6.22	05	21	55.4	6.03	05
22	1.62	20	57.2	6.21	05	29	55.3	6.02	05
23	1.70	28*	-57.1	6.20	05	37	-55.3	6.01	05
24	1.78								
$4 \tan \delta$									
25	1.87	δ	$0'$	$10'$	$20'$	$30'$	$40'$	$50'$	$60'$
26	1.95	0							
27	2.04	47	4.29	4.32	4.34	4.36	4.39	4.42	4.44
28	2.13	48	4.44	4.47	4.49	4.52	4.55	4.57	4.60
29	2.22	49	4.60	4.63	4.66	4.68	4.71	4.74	4.77
30	2.31	50	4.77	4.80	4.82	4.85	4.88	4.91	4.94
31	2.40	51	4.94	4.97	5.00	5.03	5.06	5.09	5.12
32	2.50	52	5.12	5.15	5.18	5.21	5.24	5.28	5.31
33	2.60	53	5.31	5.34	5.37	5.41	5.44	5.47	5.51
34	2.70	54	5.51	5.54	5.57	5.61	5.64	5.68	5.71
35	2.80	55	5.71	5.75	5.78	5.82	5.86	5.89	5.93
36	2.91	56	5.93	5.97	6.01	6.04	6.08	6.12	6.16
37	3.02	57	6.16	6.20	6.24	6.28	6.32	6.36	6.40
38	3.13	58	6.40	6.44	6.48	6.53	6.57	6.61	6.66
39	3.24	59	6.66	6.70	6.75	6.79	6.84	6.88	6.93
40	3.36	60	6.93	6.97	7.02	7.07	7.12	7.17	7.22
41	3.48	61	7.22	7.27	7.32	7.37	7.42	7.47	7.52
42	3.60	62	7.52	7.58	7.63	7.68	7.74	7.79	7.85
43	3.73	63	7.85	7.91	7.97	8.02	8.08	8.14	8.20
44	3.86	64	8.20	8.26	8.32	8.39	8.45	8.51	8.58
45	4.00	$\alpha_{\text{Date}} = \alpha_{1950} + f + 4 g \sin (G + \alpha_{1950}) \tan \delta_{1950}$							
46	4.14	$\delta_{\text{Date}} = \delta_{1950} + g \cos (G + \alpha_{1950})$							
47	4.29	Natural sines and cosines are given on page 291.							

BESSELIAN COEFFICIENT OF THE MEAN SECOND DIFFERENCE.

The coefficient is always negative.

<i>n</i>	<i>B''</i>	<i>n</i>	<i>n</i>	<i>B''</i>	<i>n</i>	<i>n</i>	<i>B''</i>	<i>n</i>
0.0000	—	1.0000	0.0913	—	0.9087	0.2119	—	0.7881
0.0010	0.000	0.9990	0.0937	0.042	0.9063	0.2153	0.084	0.7847
0.0030	0.001	0.9970	0.0962	0.043	0.9038	0.2189	0.085	0.7811
0.0050	0.002	0.9950	0.0987	0.044	0.9013	0.2225	0.086	0.7775
0.0070	0.003	0.9930	0.1012	0.045	0.8988	0.2261	0.087	0.7739
0.0090	0.004	0.9910	0.1037	0.046	0.8963	0.2298	0.088	0.7702
0.0111	0.005	0.9889	0.1062	0.047	0.8938	0.2335	0.089	0.7665
0.0131	0.006	0.9869	0.1088	0.048	0.8912	0.2373	0.090	0.7627
0.0152	0.007	0.9848	0.1114	0.049	0.8886	0.2411	0.091	0.7589
0.0172	0.008	0.9828	0.1139	0.050	0.8861	0.2450	0.092	0.7550
0.0193	0.009	0.9807	0.1165	0.051	0.8835	0.2490	0.093	0.7510
0.0214	0.010	0.9786	0.1192	0.052	0.8808	0.2530	0.094	0.7470
0.0235	0.011	0.9765	0.1218	0.053	0.8782	0.2571	0.095	0.7429
0.0256	0.012	0.9744	0.1245	0.054	0.8755	0.2612	0.096	0.7388
0.0277	0.013	0.9723	0.1271	0.055	0.8729	0.2654	0.097	0.7346
0.0298	0.014	0.9702	0.1298	0.056	0.8702	0.2697	0.098	0.7303
0.0320	0.015	0.9680	0.1325	0.057	0.8675	0.2741	0.099	0.7259
0.0341	0.016	0.9659	0.1353	0.058	0.8647	0.2786	0.100	0.7214
0.0363	0.017	0.9637	0.1380	0.059	0.8620	0.2832	0.101	0.7168
0.0384	0.018	0.9616	0.1408	0.060	0.8592	0.2878	0.102	0.7122
0.0406	0.019	0.9594	0.1436	0.061	0.8564	0.2926	0.103	0.7074
0.0428	0.020	0.9572	0.1464	0.062	0.8536	0.2975	0.104	0.7025
0.0450	0.021	0.9550	0.1492	0.063	0.8508	0.3025	0.105	0.6975
0.0472	0.022	0.9528	0.1521	0.064	0.8479	0.3076	0.106	0.6924
0.0494	0.023	0.9506	0.1550	0.065	0.8450	0.3129	0.107	0.6871
0.0516	0.024	0.9484	0.1579	0.066	0.8421	0.3183	0.108	0.6817
0.0539	0.025	0.9461	0.1608	0.067	0.8392	0.3239	0.109	0.6761
0.0561	0.026	0.9439	0.1638	0.068	0.8362	0.3297	0.110	0.6703
0.0584	0.027	0.9416	0.1668	0.069	0.8332	0.3356	0.111	0.6644
0.0606	0.028	0.9394	0.1698	0.070	0.8302	0.3418	0.112	0.6582
0.0629	0.029	0.9371	0.1728	0.071	0.8272	0.3483	0.113	0.6517
0.0652	0.030	0.9348	0.1759	0.072	0.8241	0.3550	0.114	0.6450
0.0675	0.031	0.9325	0.1790	0.073	0.8210	0.3621	0.115	0.6379
0.0698	0.032	0.9302	0.1821	0.074	0.8179	0.3696	0.116	0.6304
0.0722	0.033	0.9278	0.1853	0.075	0.8147	0.3775	0.117	0.6225
0.0745	0.034	0.9255	0.1885	0.076	0.8115	0.3859	0.118	0.6141
0.0769	0.035	0.9231	0.1917	0.077	0.8083	0.3951	0.119	0.6049
0.0792	0.036	0.9208	0.1950	0.078	0.8050	0.4051	0.120	0.5949
0.0816	0.037	0.9184	0.1983	0.079	0.8017	0.4163	0.121	0.5837
0.0840	0.038	0.9160	0.2016	0.080	0.7984	0.4292	0.122	0.5708
0.0864	0.039	0.9136	0.2050	0.081	0.7950	0.4452	0.123	0.5548
0.0889	0.040	0.9111	0.2084	0.082	0.7916	0.4683	0.124	0.5317
0.0913	0.041	0.9087	0.2119	0.083	0.7881	0.5000	0.125	0.5000

In critical cases ascend.

$$f_n = f_0 + n \Delta' + B'' \frac{\Delta_0'' + \Delta_1''}{2} + B''' \Delta'' + B^{iv} \frac{\Delta_0^{iv} + \Delta_1^{iv}}{2}$$

$$\text{or} \quad = f_0 + n \Delta' + E_0 \Delta_0'' + E_1 \Delta_1'' + B^{iv} \frac{\Delta_0^{iv} + \Delta_1^{iv}}{2}$$

TABLE XVII.
INTERPOLATION TABLES.

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n	E	E	n	n	B'''	n	n	B^{iv}	n
0.00	0.0000	0.0000	1.00	0.0000		1.0000	0.0000	+	1.0000
0.01	0.0033	0.0017	0.99		0.000			0.000	
0.02	0.0065	0.0033	0.98	0.0061		0.9939	0.0060		0.9940
0.03	0.0096	0.0050	0.97		+0.001 -			0.001	
0.04	0.0125	0.0067	0.96	0.0190		0.9810	0.0181		0.9819
0.05	0.0154	0.0083	0.95		+0.002 -			0.002	
0.06	0.0182	0.0100	0.94	0.0332		0.9668	0.0304		0.9696
0.07	0.0209	0.0116	0.93		+0.003 -			0.003	
0.08	0.0236	0.0132	0.92	0.0489		0.9511	0.0430		0.9570
0.09	0.0261	0.0149	0.91		+0.004 -			0.004	
				0.0667		0.9333	0.0557		0.9443
0.10	0.0285	0.0165	0.90		+0.005 -			0.005	
0.11	0.0308	0.0181	0.89	0.0877		0.9123	0.0686		0.9314
0.12	0.0331	0.0197	0.88		+0.006 -			0.006	
0.13	0.0352	0.0213	0.87	0.1140		0.8860	0.0818		0.9182
0.14	0.0373	0.0229	0.86		+0.007 -			0.007	
0.15	0.0393	0.0244	0.85	0.1532		0.8468	0.0953		0.9047
0.16	0.0412	0.0260	0.84		+0.008 -			0.008	
0.17	0.0430	0.0275	0.83	0.2735		0.7265	0.1091		0.8909
0.18	0.0448	0.0290	0.82		+0.007 -			0.009	
0.19	0.0464	0.0305	0.81	0.3210		0.6790	0.1233		0.8767
					+0.006 -			0.010	
0.20	0.0480	0.0320	0.80	0.3560		0.6440	0.1379		0.8621
0.21	0.0495	0.0335	0.79		+0.005 -			0.011	
0.22	0.0509	0.0349	0.78	0.3860		0.6140	0.1530		0.8470
0.23	0.0522	0.0363	0.77		+0.004 -			0.012	
0.24	0.0535	0.0377	0.76	0.4134		0.5866	0.1686		0.8314
0.25	0.0547	0.0391	0.75		+0.003 -			0.013	
0.26	0.0558	0.0404	0.74	0.4390		0.5610	0.1848		0.8152
0.27	0.0568	0.0417	0.73		+0.002 -			0.014	
0.28	0.0578	0.0430	0.72	0.4638		0.5362	0.2017		0.7983
0.29	0.0587	0.0443	0.71		+0.001 -			0.015	
				0.4879		0.5121	0.2195		0.7805
0.30	0.0595	0.0455	0.70		0.000			0.016	
0.31	0.0602	0.0467	0.69						
0.32	0.0609	0.0479	0.68	0.5000		0.5000	0.2383		0.7617
0.33	0.0615	0.0490	0.67					0.017	
0.34	0.0621	0.0501	0.66	<i>In critical cases ascend.</i>			0.2584		0.7416
0.35	0.0626	0.0512	0.65					0.018	
0.36	0.0630	0.0522	0.64	<p>In the table on the left E_0 is to be taken from the column adjacent to the argument, and E_1 from the other column. Note that this coefficient is always negative.</p> <p>For formulæ of application see foot of previous page. For further explanation see page 798.</p>			0.2801		0.7199
0.37	0.0633	0.0532	0.63					0.019	
0.38	0.0636	0.0542	0.62				0.3040		0.6960
0.39	0.0638	0.0551	0.61					0.020	
							0.3311		0.6689
0.40	0.0640	0.0560	0.60					0.021	
0.41	0.0641	0.0568	0.59				0.3631		0.6369
0.42	0.0641	0.0577	0.58					0.022	
0.43	0.0641	0.0584	0.57				0.4049		0.5951
0.44	0.0641	0.0591	0.56					0.023	
0.45	0.0639	0.0598	0.55				0.5000		0.5000
0.46	0.0638	0.0604	0.54						
0.47	0.0635	0.0610	0.53				<i>In critical cases ascend.</i>		
0.48	0.0632	0.0616	0.52						
0.49	0.0629	0.0621	0.51						
0.50	0.0625	0.0625	0.50						

FOR INTERPOLATION WITH PRINTED VARIATIONS.

h	h'	h	h'	h	h'	h	h'	h	h'	h	h'	m	m'	m	m'
h		h		h		h		h		h		m		m	
0.000	0.00	4.874	0.50	6.910	1.00	8.471	1.50	9.785	2.00	10.943	2.50	0.000	0.0	21.213	3.8
0.489	0.01	4.923	0.51	6.945	1.01	8.499	1.51	9.810	2.01	10.965	2.51	2.449	0.1	21.494	3.9
0.848	0.02	4.971	0.52	6.979	1.02	8.527	1.52	9.834	2.02	10.987	2.52	4.243	0.2	21.771	4.0
1.095	0.03	5.019	0.53	7.014	1.03	8.555	1.53	9.859	2.03	11.009	2.53	5.477	0.3	22.045	4.1
1.296	0.04	5.067	0.54	7.048	1.04	8.583	1.54	9.883	2.04	11.030	2.54	6.480	0.4	22.315	4.2
1.469	0.05	5.114	0.55	7.082	1.05	8.611	1.55	9.907	2.05	11.052	2.55	7.348	0.5	22.583	4.3
1.624	0.06	5.161	0.56	7.116	1.06	8.639	1.56	9.931	2.06	11.074	2.56	8.124	0.6	22.847	4.4
1.766	0.07	5.207	0.57	7.149	1.07	8.667	1.57	9.955	2.07	11.095	2.57	8.831	0.7	23.108	4.5
1.897	0.08	5.253	0.58	7.183	1.08	8.694	1.58	9.979	2.08	11.117	2.58	9.486	0.8	23.366	4.6
2.019	0.09	5.299	0.59	7.216	1.09	8.722	1.59	10.004	2.09	11.139	2.59	10.099	0.9	23.622	4.7
2.135	0.10	5.344	0.60	7.249	1.10	8.749	1.60	10.027	2.10	11.160	2.60	10.677	1.0	23.874	4.8
2.244	0.11	5.388	0.61	7.282	1.11	8.777	1.61	10.051	2.11	11.182	2.61	11.225	1.1	24.124	4.9
2.349	0.12	5.433	0.62	7.315	1.12	8.804	1.62	10.075	2.12	11.203	2.62	11.747	1.2	24.372	5.0
2.449	0.13	5.477	0.63	7.348	1.13	8.831	1.63	10.099	2.13	11.224	2.63	12.247	1.3	24.617	5.1
2.545	0.14	5.520	0.64	7.381	1.14	8.858	1.64	10.123	2.14	11.246	2.64	12.727	1.4	24.859	5.2
2.638	0.15	5.564	0.65	7.413	1.15	8.885	1.65	10.146	2.15	11.267	2.65	13.190	1.5	25.099	5.3
2.727	0.16	5.607	0.66	7.445	1.16	8.912	1.66	10.170	2.16	11.288	2.66	13.638	1.6	25.337	5.4
2.814	0.17	5.649	0.67	7.477	1.17	8.939	1.67	10.194	2.17	11.310	2.67	14.071	1.7	25.573	5.5
2.898	0.18	5.692	0.68	7.509	1.18	8.966	1.68	10.217	2.18	11.331	2.68	14.491	1.8	25.807	5.6
2.979	0.19	5.734	0.69	7.541	1.19	8.993	1.69	10.241	2.19	11.352	2.69	14.899	1.9	26.038	5.7
3.059	0.20	5.775	0.70	7.573	1.20	9.019	1.70	10.264	2.20	11.373	2.70	15.297	2.0	26.267	5.8
3.136	0.21	5.817	0.71	7.605	1.21	9.046	1.71	10.287	2.21	11.394	2.71	15.684	2.1	26.495	5.9
3.212	0.22	5.858	0.72	7.636	1.22	9.073	1.72	10.311	2.22	11.415	2.72	16.062	2.2	26.720	6.0
3.286	0.23	5.899	0.73	7.668	1.23	9.099	1.73	10.334	2.23	11.436	2.73	16.431	2.3	26.944	6.1
3.358	0.24	5.939	0.74	7.699	1.24	9.125	1.74	10.357	2.24	11.457	2.74	16.792	2.4	27.166	6.2
3.429	0.25	5.979	0.75	7.730	1.25	9.152	1.75	10.380	2.25	11.478	2.75	17.146	2.5	27.386	6.3
3.498	0.26	6.019	0.76	7.761	1.26	9.178	1.76	10.403	2.26	11.499	2.76	17.492	2.6	27.604	6.4
3.566	0.27	6.059	0.77	7.792	1.27	9.204	1.77	10.426	2.27	11.520	2.77	17.832	2.7	27.820	6.5
3.633	0.28	6.099	0.78	7.823	1.28	9.230	1.78	10.449	2.28	11.541	2.78	18.165	2.8	28.035	6.6
3.698	0.29	6.138	0.79	7.853	1.29	9.256	1.79	10.472	2.29	11.562	2.79	18.493	2.9	28.249	6.7
3.762	0.30	6.177	0.80	7.884	1.30	9.282	1.80	10.495	2.30	11.582	2.80	18.814	3.0	28.460	6.8
3.826	0.31	6.216	0.81	7.914	1.31	9.308	1.81	10.518	2.31	11.603	2.81	19.131	3.1	28.670	6.9
3.888	0.32	6.254	0.82	7.944	1.32	9.333	1.82	10.541	2.32	11.624	2.82	19.442	3.2	28.879	7.0
3.949	0.33	6.292	0.83	7.974	1.33	9.359	1.83	10.564	2.33	11.644	2.83	19.748	3.3	29.086	7.1
4.009	0.34	6.330	0.84	8.005	1.34	9.385	1.84	10.586	2.34	11.665	2.84	20.049	3.4	29.291	7.2
4.069	0.35	6.368	0.85	8.034	1.35	9.410	1.85	10.609	2.35	11.686	2.85	20.347	3.5	29.495	7.3
4.127	0.36	6.406	0.86	8.064	1.36	9.436	1.86	10.632	2.36	11.706	2.86	20.639	3.6	29.698	7.4
4.185	0.37	6.443	0.87	8.094	1.37	9.461	1.87	10.654	2.37	11.726	2.87	20.928	3.7	29.899	7.5
4.242	0.38	6.480	0.88	8.124	1.38	9.486	1.88	10.677	2.38	11.747	2.88	21.213	3.8	30.000	7.6
4.298	0.39	6.517	0.89	8.153	1.39	9.512	1.89	10.699	2.39	11.767	2.89	<div>In critical cases ascend.</div> <div>For further explanation see page 798.</div>			
4.354	0.40	6.554	0.90	8.182	1.40	9.537	1.90	10.721	2.40	11.788	2.90				
4.409	0.41	6.590	0.91	8.212	1.41	9.562	1.91	10.744	2.41	11.808	2.91				
4.463	0.42	6.627	0.92	8.241	1.42	9.587	1.92	10.766	2.42	11.828	2.92				
4.516	0.43	6.663	0.93	8.270	1.43	9.612	1.93	10.788	2.43	11.849	2.93				
4.569	0.44	6.699	0.94	8.299	1.44	9.637	1.94	10.811	2.44	11.869	2.94				
4.621	0.45	6.734	0.95	8.328	1.45	9.662	1.95	10.833	2.45	11.889	2.95				
4.673	0.46	6.770	0.96	8.357	1.46	9.687	1.96	10.855	2.46	11.909	2.96				
4.724	0.47	6.805	0.97	8.385	1.47	9.711	1.97	10.877	2.47	11.929	2.97				
4.774	0.48	6.841	0.98	8.414	1.48	9.736	1.98	10.899	2.48	11.949	2.98				
4.824	0.49	6.876	0.99	8.442	1.49	9.761	1.99	10.921	2.49	11.969	2.99				
4.874		6.910		8.471		9.785		10.943		11.989					

$$f_h = f_0 + hV_h + h'V'_h$$

$$f_m = f_0 + mV_m + m'V'_m$$

FOR INTERPOLATION WITH PRINTED VARIATIONS.

h	Interval 24^h		Interval 12^h		h	Interval 24^h	
	h''	h'''	h''	h'''		h''	h'''
h m					h m		
0 00	-0.000	-0.00	-0.000	-0.00	6 00	-0.313	-0.12
10	.000	.00	.001	.00	10	.328	.13
20	.001	.00	.002	.00	20	.344	.13
30	.003	.00	.005	.00	30	.361	.14
40	.005	.00	.009	.00	40	.377	.15
50	.007	.00	.014	.01	50	.394	.16
1 00	-0.010	-0.00	-0.020	-0.01	7 00	-0.411	-0.16
10	.014	.00	.027	.01	10	.429	.17
20	.018	.01	.034	.01	20	.446	.18
30	.023	.01	.043	.02	30	.464	.19
40	.028	.01	.053	.02	40	.482	.19
50	.033	.01	.063	.02	50	.500	.20
2 00	-0.039	-0.01	-0.074	-0.03	8 00	-0.519	-0.21
10	.046	.02	.086	.03	10	.537	.22
20	.053	.02	.099	.04	20	.556	.23
30	.061	.02	.112	.04	30	.575	.24
40	.069	.03	.126	.05	40	.594	.24
50	.077	.03	.141	.05	50	.613	.25
3 00	-0.086	-0.03	-0.156	-0.06	9 00	-0.633	-0.26
10	.095	.04	.172	.07	10	.652	.27
20	.105	.04	.189	.07	20	.672	.28
30	.115	.04	.206	.08	30	.692	.29
40	.126	.05	.223	.09	40	.712	.30
50	.137	.05	.241	.10	50	.732	.31
4 00	-0.148	-0.06	-0.259	-0.11	10 00	-0.752	-0.32
10	.160	.06	.278	.11	10	.773	.33
20	.172	.06	.297	.12	20	.793	.34
30	.185	.07	.316	.13	30	.813	.35
40	.197	.07	.336	.14	40	.834	.36
50	.211	.08	.356	.15	50	.855	.37
5 00	-0.224	-0.09	-0.376	-0.16	11 00	-0.875	-0.38
10	.238	.09	.397	.17	10	.896	.39
20	.252	.10	.417	.18	20	.917	.40
30	.267	.10	.438	.19	30	.938	.41
40	.282	.11	.458	.20	40	.958	.42
50	.297	.12	.479	.21	50	.979	.43
6 00	-0.313	-0.12	-0.500	-0.22	12 00	-1.000	-0.44

Notation:— f_0 V V' V'' V'''

V' and V''' being taken on the same side of f_0 as $f_{\pm h}$
 Formula:— $f_{\pm h} = f_0 \pm hV + h'V' \pm h''V'' + h'''V'''$

where $h' = \frac{h^2}{48}$ for interval 24^h and $\frac{h^2}{24}$ for interval 12^h .

For further explanation see page 798.

SUN, MOON, PLANETS, ETC.

☉ The Sun	⊕ The Earth	♅ Uranus
☾ The Moon	♂ Mars	♆ Neptune
☿ Mercury	♃ Jupiter	♁ Comet
♀ Venus	♄ Saturn	* Star

♁, ♁, ♁, etc., Minor planets

SIGNS OF THE ZODIAC

♈ Aries 0°	♌ Leo 120°	♐ Sagittarius 240°
♉ Taurus 30	♍ Virgo 150	♑ Capricornus 270
♊ Gemini 60	♎ Libra 180	♒ Aquarius 300
♋ Cancer 90	♏ Scorpio 210	♓ Pisces 330

ASPECTS

- ♌ Conjunction, or having the same longitude or right ascension
 ☐ Quadrature, or differing by 90° in longitude or right ascension
 ♌ Opposition, or differing by 180° in longitude or right ascension

SYMBOLS

- ♊ Ascending node ♋ Descending node
 + Symbol of northern latitude or declination, or of westerly longitude or hour angle
 - Symbol of southern latitude or declination, or of easterly longitude or hour angle

ABBREVIATIONS

N. North	^d Days	° Degrees
S. South	^h Hours	' Minutes of arc
E. East	^m Minutes of time	" Seconds of arc
W. West	^s Seconds of time	

See also Contractions, page 731

GREEK ALPHABET

A α Alpha	I ι Iota	P ρ Rho
B β Beta	K κ Kappa	Σ σ Sigma
Γ γ Gamma	Λ λ Lambda	T τ Tau
Δ δ Delta	M μ Mu	Υ υ Upsilon
E ε Epsilon	N ν Nu	Φ φ Phi
Z ζ Zeta	Ξ ξ Xi	X χ Chi
H η Eta	O ο Omicron	Ψ ψ Psi
Θ θ Theta	Π π Pi	Ω ω Omega

ω An alternative form for Pi

A.N.	Almanaque Nautico (San Fernando)
A.E.	American Ephemeris and Nautical Almanac (Washington)
A.G.	Astronomische Gesellschaft
B.J.	Berliner Jahrbuch (Berlin)
B.	Bode's Catalogue (1801)
B.D.	Bonn Durchmusterung
B.A.C.	British Association Catalogue
C.P.D.	Cape Photographic Durchmusterung
C.T.	Connaissance des Temps (Paris)
C.D.	Cordoba Durchmusterung
Dec.	Declination
E.B.L.	Eigenbewegungs Lexikon (Schorr)
G.F.H.	Geschichte des Fixsternhimmels
G.	Gould's <i>Uranometria Argentina</i>
G.M.T.	Greenwich Mean Time
H'.	Heis's <i>Catalogus Stellarum</i>
H.D.	Henry Draper Catalogue
H.	Hevelius's Catalogue (1660)
H.P.	Horizontal parallax
J.D.	Julian Day
M.	Messier's Catalogue of Nebulæ
N.A.	Nautical Almanac and Astronomical Ephemeris (London)
N.G.C.	New General Catalogue of Nebulæ, <i>Memoirs of R.A.S.</i> , 49
N.P.D.	North polar distance = $90^{\circ} - \delta$
P.A.	Position angle
P.M.	Proper motion
R.A.	Right ascension
S.D.	Semi-diameter
W.Z.C.	Washington Zodiacal Catalogue
W.B.	Weisse's Bessel
Z.D.	Zenith distance

Throughout the NAUTICAL ALMANAC Roman letters are used for contractions, e.g., R.A. for right ascension, and italic letters for symbols, e.g., *P* for position angle.

In the following lists a few symbols not actually occurring in the NAUTICAL ALMANAC, but well established in spherical and dynamical astronomy, are included; those used for a temporary or special purpose are not included here, but are defined as they occur.

ITALIC ALPHABET

<i>A, B, C, D, E</i>	Besselian day numbers
<i>A, B, C, a, b, c</i>	Gaussian constants of an orbit
<i>a, b, c</i>	Quantities for reduction for precession
<i>a, b, c, d</i>	Besselian star constants
<i>A</i>	Azimuth
<i>a</i>	Semi-major axis of an orbit; equatorial radius of the earth
<i>b</i>	Heliocentric latitude; semi-minor axis of an orbit; polar radius of the earth
<i>d</i>	Symbol of differentiation
<i>E</i>	Eccentric anomaly
<i>e</i>	Eccentricity; base of natural logarithms = 2.7182818285 . .
<i>f, g, G, h, H, i</i>	Independent day numbers
<i>f, F</i>	Symbol of a function
<i>G</i>	Galactic longitude
<i>g</i>	Intensity of gravity; sometimes used for mean anomaly (see also <i>M</i>); galactic latitude
<i>H</i>	Altitude above the horizon
<i>h</i>	Hour angle
<i>i</i>	Inclination to plane of ecliptic
<i>k</i>	Gaussian gravitation constant; constant of aberration; ratio of the Moon's diameter to Earth's equatorial diameter; coefficient of refraction
<i>L</i>	Mean longitude = $\Omega + \omega + M$; see also \odot and ζ
<i>l</i>	Heliocentric longitude
<i>M</i>	Mean anomaly (see also <i>g</i>); modulus of common logarithms
<i>m</i>	Annual precession in R.A.; mass
<i>n</i>	Annual precession in declination; sometimes used for mean daily motion (see also μ)
<i>P</i>	Position angle, measured from the north towards the east; period of a planet or comet
<i>p</i>	General precession in longitude
<i>q</i>	Perihelion distance; parallactic angle
<i>R</i>	Radius vector of the Sun (or Earth)
<i>r</i>	Radius vector, expressed in astronomical units
<i>T</i>	Time expressed in units of a century; time of perihelion passage
<i>t</i>	Time expressed in years or smaller units
<i>u</i>	Argument of latitude = $\omega + v$
<i>v</i>	True anomaly or angle from perihelion
<i>X, Y, Z</i>	Geocentric equatorial rectangular co-ordinates of the Sun
<i>x, y, z</i>	Heliocentric equatorial rectangular co-ordinates
<i>z*</i>	Zenith distance

* The symbol *Z* on page 54 should be *z*.

GREEK ALPHABET

α	Right ascension
β	Geocentric latitude
Δ	Difference ; symbol of increment ; geocentric distance
δ	Declination
ϵ	Obliquity of the ecliptic
θ	Sometimes (but not in <i>N.A.</i>) used for longitude of ascending node (see also \oslash)
λ	Geocentric longitude ; planetary precession on the equator
μ	Mean daily motion ; proper motion
ξ, η, ζ	Geocentric rectangular equatorial co-ordinates
π	Ratio of circumference to diameter ; parallax ; used by Newcomb for longitude of perigee
$\tilde{\omega}$	Longitude of perihelion = $\oslash + \omega$
ρ	Distance from centre of earth in units of earth's equatorial radius
Σ	Symbol of summation
τ	Fraction of the year since the commencement of the Besselian fictitious year
ϕ	Geographical latitude ; eccentric angle of an orbit ($\sin \phi = e$)
ϕ'	Geocentric latitude
ψ	Luni-solar precession in longitude
ω	Arc from node to perihelion = $\tilde{\omega} - \oslash$

SYMBOLS

\odot	Mean longitude of the Sun
\lrcorner	Mean longitude of the Moon
\oslash	Longitude of ascending node
γ	First point of Aries
+	Symbol of northern latitude or declination, and of westerly longitude and hour angle
-	Symbol of southern latitude or declination, and of easterly longitude and hour angle
[]	Symbol of summation ; also used to enclose a factor given as a logarithm

EXPLANATION.

THE CALENDAR

A calendar is a method of combining days into periods adapted to the purposes of civil life and religious observances, or to the requirements of scientific precision, such as weeks, months and years. Three of the periods used in calendars, namely days, months and years, are based on those astronomical periods which have the greatest importance for the conditions of human life. Other measures of time, such as the week and the subdivisions of the day, are artificial.

The complexity of calendars is due mainly to the incommensurability of the astronomical periods on which they are based. The supply of light by the two great luminaries is governed by the periods known to astronomers as the solar day and the synodic month, while the return of the seasons depends on the tropical year. The length of the synodic month at the present time is 29.5305879 days, while that of the tropical year is 365.24219 days, each period being subject to an uncertainty of about one unit in the last figure given. Both periods are slowly decreasing, the synodic month or lunation by about three and a half units in the last figure every century, and the year by about one unit in the last figure every century. From the lengths of these two periods we find that the number of lunations in a tropical year is 12.3682668, decreasing by about two units in the last figure every century. The changes in the lengths of these periods are of little importance in the study of calendars.

Egyptian Calendar.—The Egyptian year from an extremely remote date consisted of 12 months of 30 days each, followed by 5 days called in Greek *ἑπαιρόμενα* or "added", making 365 days altogether. The 30-day period is obviously based on the lunation, so that the calendar must at some date have been governed by the Moon, while its primitive connection with the solar year is proved by its division into three seasons—Flood time, Seed time, Harvest time—each containing four months, which in hieroglyphics are always designated by their place in the season to which they were supposed to belong. But before the earliest times known to us, all attempt to equate the calendar month to the phases of the Moon or the calendar seasons to the natural seasons had been abandoned, and the beginning of the Egyptian year and of the calendar seasons gradually retrograded, returning to its place in the tropical year in 1505 tropical or 1506 Egyptian years. The Egyptians, however, used to check the relation of the calendar to the natural year, not by the solstices and equinoxes, but by the heliacal rising of Sirius, which, according to Herr Schoch's determination,* returned in the latitude of Memphis at a mean interval of 365.2507 days. The Egyptians, taking the length of the natural year as 365.25 days, formed a cycle of 1461 calendar years which they equated to 1460 natural years, and which was known by the name of the Sothic or dog-star cycle. In the absence of an accurate historical chronology and of a continuous record of years a cycle of this length had a purely theoretical importance.

The Egyptian calendar was, up to the time of Julius Cæsar's reform of the Roman calendar in 46 B.C., the only civil calendar in which the length of each month and of each year was fixed by rule, instead of being determined by the discretion of officials or by direct observation. If the number of years between two astronomical observations, dated by the Egyptian calendar, was known, the exact number of days could be determined by a simple calculation. No such comparison could be made between dates referred to any other civil calendar unless the computer had access to a record showing the number of days which had actually been assigned to each month and the number of months which had actually been assigned to each year. It is

* *Die Länge der Sothisperioden beträgt 1456 Jahre*, Selbstverlag, Berlin-Steglitz, 1928.

true that the Egyptians did not use a continuous era, but were content to number the years of each reign separately, so that there was a difficulty in identifying a particular year, but the astronomers of the Ptolemaic age rectified this by the introduction of eras. The simplicity and regularity of the Egyptian calendar commended it to astronomers, who found it excellently adapted to the construction of tables, which could be readily applied and which could be used even for a remote past or for a distant future without any fear that the system by which time was reckoned in the tables might not coincide with the system in actual use. In the second century B.C. we find Chaldean observations, sometimes nearly six centuries old, reduced to the Egyptian calendar in the works of Hipparchus, who observed not in Egypt but at Rhodes, and cited from him by the Egyptian Ptolemy in the second century of our era, and we also find in the second century B.C. an Athenian observation of 432 B.C. reduced to the Egyptian calendar on an inscription found at Miletus, which appears to represent the work of the astronomer Epigenes.

Each Egyptian month had its proper festival. These festivals were finally fixed about 1200 B.C., and in Aramaic and Greek texts from the fifth century B.C. onwards the Egyptian months bear names based on the monthly festivals.

An attempt by Ptolemy Euergetes in 238 B.C. to introduce a sixth *ἑξαγομένη* once in four years failed, but a renewed attempt under Augustus (26-23 B.C.) was more successful. An additional day was inserted at the close of the Egyptian year 23-22 B.C. on August 29 of what we call the Julian calendar, and at the close of every fourth year afterwards, so that the reformed or Alexandrine year began on August 30 of the Julian calendar in the year preceding a Julian leap year and on August 29 in all other years. The effect of this reform was to keep each Egyptian month fixed to the place in the natural year which it happened to occupy under the old calendar in the years 26-22 B.C. But the old calendar was not easily suppressed, and we find the two used side by side till A.D. 238 at least. The old calendar was probably the more popular, and was preferred by astronomers and astrologers. Ptolemy always used it, except in his treatise on annual phenomena, for which the new calendar was obviously more convenient. Theon in the fourth century A.D., though mentioning the old calendar, habitually used the new.

The old Egyptian calendar survives in a slightly modified form in the Armenian calendar, the three first months of the old Egyptian year corresponding exactly with the three last months of the Armenian year. These are followed in the Armenian calendar by the five additional days, so that for the remainder of the year the Armenian months begin five days later than those of the old Egyptian calendar. The Alexandrine calendar is still in use in Abyssinia and in the Coptic church.

Babylonian Calendar.—The main principles of the Babylonian calendar became fixed in the latter half of the third millennium before Christ. The year began in the spring with the month *Nisanu*. It contained ordinarily twelve months, the beginnings of which were fixed by observation of the lunar crescent. In this calendar, as in all lunar calendars except the Mohammedan, one of the months was repeated when necessary, in order to keep each month fixed to a definite season in the year. At Babylon the month so repeated was most commonly the last month *Addaru*, but not infrequently the sixth month *Ululu*, and very occasionally some other month. The intercalary month was inserted at very irregular intervals, the known intervals between one intercalation and the next varying from six months to six years. It would appear that from the accession of Nabonassar in 747 B.C. a record was kept of the observations in each month and of the number of days that were assigned to each month. This made it possible to define the exact interval between observations and provided the means for a precise determination of astronomical periods, especially those which affected the times and magnitudes of lunar eclipses. The oldest precise determination of which we have any knowledge was the eclipse period or *saros* in which 223 lunations were taken as equal to 6585½ days. The correct astronomical length of 223 lunations was 6585·323 days, so that the error would amount to one day

in about 1800 years. This period must have been known early in the sixth century B.C. The saros is independent of the length of the tropical year, but Geminus and Ptolemy state that the motion of the Sun in longitude in the saros period was taken as equal to 18 revolutions plus $10\frac{2}{3}^{\circ}$. The correct time for the Sun's longitude to increase by this amount was 6585.19 days, so that the assumed length of the natural year involved an error of about 0.14 day in 18 years.

From 529 to 504 B.C. an octaeteris or 8-year cycle was in use at Babylon. In this the length of each month was still determined by observation of the crescent, but the intercalary months occupied fixed places in the cycle and each cycle of 8 years was made to contain 99 months. The effect of this was to make the mean length of eight years amount to 2923.53 days as compared with a correct duration of 2921.94 days and the received value of 2922 days. It is not surprising that this cycle was soon laid aside and arbitrary intercalation resumed. If we may accept Schnabel's dates* for Naburianos and Cidenas there was a steady improvement in the determination of astronomical constants in the next age. Naburianos about 500 B.C. found for the synodic month a length of 29.530614 days as compared with the correct value of 29.530596 days, and for the year 365.2609 days as compared with the correct value of 365.2425 days for the tropical year. But since the length of the year was derived from the inequalities which it produced in the length of the month, it would be more correct to compare it with the anomalistic year which had a duration of 365.2598 days. Cidenas about 383 B.C. determined the length of the synodic month as 29.530594 days. He also determined the length of the tropical year as 365.236 days. In 383 B.C. a 19-year cycle of intercalations was introduced at Babylon, which continued in use as long as a Babylonian calendar can be traced. This provided for 7 intercalary months occupying fixed places in each cycle of 19 years, so that 19 years were equated to 235 lunations. The beginning of each month continued to be determined by observation of the lunar crescent. An astronomical 19-year cycle had, as will be seen, been published by Meton at Athens in 432 B.C. The effect of the Babylonian 19-year cycle is to make the mean year consist of 12.36842 lunations, and to make the mean calendar year consist of 365.2468 days, an excess of 0.0043 over the correct value.† Cidenas' value for the mean synodic month is retained in the modern Jewish calendar, as is the system of seven intercalations in 19 years, so that the Jewish calendar continues to imply a length of 365.2468 days for the year.

Greek Calendars.—All Greek calendars were lunar until the Roman period. Each community had a separate calendar. Bischoff has succeeded in putting together more or less complete lists of months in about a hundred Greek calendars.‡ There was great variety in the season when the year began in different calendars. But each month was kept roughly to one season of the year by the insertion of a thirteenth or intercalary month when required. In some calendars this was done by repeating the sixth month, in some by repeating the twelfth month; but in a few the intercalary month occupied other positions, and at Athens there are four instances preserved on inscriptions where an intercalation was made at an exceptional place in the year, and it is probable that the same happened elsewhere from time to time. Not only the intercalation of months, but also the regulation of the length of each month, appears to have been always in the hands of the public authorities, and if, as time advanced, they paid increasing respect to astronomical calendars, there is no evidence that any astronomical calendar ever acquired legal validity. The beginning of the Attic civil year is known to have fluctuated by 50 days as compared with the natural year during the Peloponnesian war.§ We have less definite information as to the extent to which the beginning of the civil month was permitted to depart from the New Moon, but Aristophanes in *The Clouds*, acted in 423 B.C., makes the Moon complain that the days are not being kept correctly according to the Moon.

* *Zeitschrift für Assyriologie*. N.F., Band II (XXXVI) (1926), pp. 11, 16.

† For the Babylonian astronomical constants see Schnabel, *ubi supra*, and Fotheringham, *The Observatory*, LI (1928 October), pp. 301-315.

‡ Pauly-Wissowa, *Real-Encyclopädie*, X (1919) 1567-1602.

§ See Meritt, *The Athenian Calendar* (Harvard University Press, 1928).

During the fifth century B.C. the Athenians had a senatorial or financial year, which was independent of the ordinary civil year and of the Moon. The council of 500 was divided into ten boards or prytanies, each of which functioned for the tenth part of the senatorial year. Meritt has shown that this year was a solar year of approximately $365\frac{1}{4}$ days, beginning about July 9 of the Julian calendar, though the actual length could be varied at the discretion of the competent authorities. Inscriptions dealing with public accounts regularly date by the days of the different prytanies, though the year consisting of lunar months regulated the admission of magistrates, the celebration of festivals, and the proceedings of courts and assemblies. The financial year was, however, accommodated to the lunar calendar in or about 403 B.C.

The Macedonian calendar, which was of the Greek type, became current in western Asia as a result of Alexander's conquests, and even competed with the native calendar in Egypt. But in the Roman period the Greek calendars of Asia became purely solar calendars.

From the sixth century B.C. onwards the Greek astronomers, beginning with Cleostratus of Tenedos, framed a number of cycles, in which each month and year were given exact lengths dependent on their places in the cycle, and the attempt was made, so far as could be done without making the cycle too cumbrous, to maintain both for the mean month and for the mean year their correct astronomical values. It was an easy matter to compute the interval from one date to another in a calendar regulated by cycle, which was independent of the discretion of city governments. The original intention may have been merely to facilitate the determination of the age of the Moon and the season of the year, but the Metonic and Callippic cycles at least came to be used for dating astronomical observations.

The cycle invented by Cleostratus was an *octaeteris* or 8-year cycle and it probably dates from the time when an 8-year cycle was in use at Babylon. It made 8 years equal to 99 lunations and to 2922 days. As 99 lunations contain 2923.53 days, this form of the octaeteris would, if persisted in, have led rapidly to a large error in the tabular date of New Moon. Geminus records successive improvements in this calendar without mentioning their dates. The first was to add 3 days every 16 years, thus making 16 years equal to 198 lunations and to 5847 days. As 16 years should be 5843.88 days and 198 lunations should be 5847.06 days, the increased accuracy in the month was purchased at the expense of a large error in the year. Finally, we are told that a month of 30 days was omitted once every 160 years, so that 160 years were made equal to 1979 lunations and to 58440 days. As the correct length of 160 years was 58438.8 days and of 1979 lunations 58441.0 days, the error in each was only about one day in 160 years.

It was probably long before the octaeteris had reached its final form that the Athenian astronomer Meton published his 19-year cycle, which began on June 27, 432 B.C., this being according to Meton the day of the summer solstice and the 13th day of the lunar month Scirophorion. The months in this calendar had the same names as the Attic months, and the intercalation was made as in the Attic calendar by repeating the sixth month, Poseideon. But the length of each year and month was made dependent on its place in the cycle, which also governed intercalation. In this cycle 19 years were made equal to 235 months and to 6940 days. The correct length of 235 months was 6939.69 days, and of 19 tropical years 6939.61 days, but Meton may have been aware of Naburianos' value for the year, which made 19 years equal to 6939.95 days.

An attempt to improve on this calendar was made by Callippus, who gave to the year its generally received value of 365.25 days, and combined four 19-year periods to form a period of 76 years, which he made one day shorter than four Metonic periods, so that it consisted of 27759 days, which he equated to 940 lunations. This made 19 years equal to 235 lunations and to 6939.75 days, a great improvement on Meton in respect both of the synodic month and of the tropical year. Callippus'

first cycle was made to begin in 330 B.C., when the summer solstice and New Moon coincided. It appears to have been used by astronomers as a means of dating for two centuries.

The last of the Greek astronomical cycles was that devised by Hipparchus, who proposed to omit one day from every fourth Callippic cycle, thus making a cycle of 304 years equal to 3760 lunations and to 111035 days. This would give a length of 29·530585 days to the lunar month and of 365·24671 days to the year. The former approximates very closely to Cidenas' value, which Hipparchus had adopted; the latter is almost identical with the value assumed by the 19-year cycle in use at Babylon in Hipparchus' time and is still nearer to the value 365·24667, which he himself deduced from observations. Neither Hipparchus himself nor anyone else appears to have made use of this cycle.

The lunar calendar was not suitable for determining the proper season for agricultural operations. In order to know the exact time of the year the Greek farmer used to observe the annual risings and settings of certain of the fixed stars, and to note the solstices and the comings of birds. Hesiod gives some information in his *Works and Days* on this subject. In the fifth century B.C. paraepgmata showing the annual dates of the principal risings and settings and the weather that might be expected to follow them began to be constructed, and the published calendars of Meton and Euctemon included these. Fragments of Milesian paraepgmata of the second century B.C. are preserved. They are arranged according to the solar year, with a hole against each day and instructions, sadly mutilated, for showing the lunar month and day by means of movable pegs.

Roman Calendar.—The Roman calendar, which is now used throughout the whole world, had its origin in the local calendar of the city of Rome. It is generally stated by our ancient authorities that the year of Romulus consisted of 304 days divided into 10 months beginning with March, and that Numa introduced a lunar year and added January and February. It may be regarded as certain that the Roman months were originally lunar, and throughout the republican period the normal length of the year remained 355 days, exceeding 12 lunations by 0·63 days. This small excess could have been compensated by making the intercalary month consist sometimes of 27 and sometimes of 28 days. Such a month was in fact inserted, when it was considered necessary, after February 23. But in historical times at least the five last days of February were not repeated after the close of the intercalary month. As the days at Rome were generally enumerated in reference to the next following Kalends (1st of month), Nones (5th or 7th of month), or Ides (13th or 15th of month), it is a purely academic question whether the five days preceding the Kalends of March were part of February or part of the intercalary month. Both views can be supported from classical texts. At all events the failure to repeat these five days necessitated a departure of the calendar from the Moon. We do not know when this took place, but, if the eclipse of Ennius is correctly dated in the 350th year of the city, then we have an eclipse of the Sun on June 5 of the Roman calendar as far back as 400 B.C., and we may infer that the calendar had by that date worked free from the Moon. In historical times the months of March, May, Quintilis (July) and October contained 31 days each, the months April, June, Sextilis (August), September, November, December and January 29 days each, while February contained 28 days. In March, May, Quintilis and October the Nones were on the 7th day and the Ides on the 15th; in the other months the Nones were on the 5th day and the Ides on the 13th. The intercalary month was generally inserted in alternate years, but the actual regulation of intercalation was in the hands of the pontifices.

Under the pontificate of Julius Cæsar, who became Pontifex Maximus in 63 B.C., intercalation was neglected with such frequency that the Kalends of January, which had fallen on or about December 13 of the subsequent Julian calendar at the close of 64 B.C., fell on October 13 of that calendar at the close of 47 B.C. In order to restore the months to their normal position in the natural year, Cæsar not

only gave the year corresponding to 46 B.C. the usual intercalation of 23 days after February 23, but inserted two additional intercalary months, amounting together to 67 days, between November and December, so that the Kalends of 45 B.C. fell on what is still called January 1 of the Julian Calendar. From that time each month has had its present duration, the sixth day before the Kalends of March being repeated when necessary. The intercalary day came to be called *ante diem bis sextum Kalendas Martias*, or more briefly *bissexturn*, whence our word bissextile for leap year.

The revised calendar, in framing which Cæsar had the assistance of the astronomer Sosigenes of Alexandria, adopted for the mean year the value current in Egypt, 365·25 days, three years out of four being given 365 days, and the fourth 366 days. As the calendar year was purely solar, the annual astronomical phenomena were expected to return annually on the same dates, and an almanac showing these dates was published with the new calendar. This rendered unnecessary the observation of these phenomena by farmers, who were now able to orientate themselves in the natural year by means of the new calendar.

Cæsar's edict requiring the intercalary day to be inserted every fourth year was misunderstood by the pontifices, who reckoned the four years inclusively and intercalated at intervals of three years. In consequence the year 8 B.C. began three days too late. Augustus rectified this error by omitting all intercalations till A.D. 8, from which date the Julian calendar was observed strictly till the reform of Pope Gregory XIII in A.D. 1582. As the first year of the new calendar (45 B.C.) was a bissextile or leap year, it follows that years of the Christian era divisible by four are leap years. The name Quintilis was changed to July (Julius) in 44 B.C. in honour of Julius Cæsar and the name Sextilis was changed to August (Augustus) in 8 B.C. in honour of Augustus Cæsar. Later attempts to change the names of months were unsuccessful.

The position of the Roman intercalary month agrees with the ancient tradition that March was originally regarded as the first month of the year. The years were commonly designated by the names of the consuls, so that the designation changed on the day when the new consuls along with the other curule magistrates entered office. After considerable fluctuation the date of entering office was fixed as March 15 about 222 B.C., but was transferred to January 1 in 153 B.C., and was never afterwards changed. In this way January became the first month of the official year. In the eastern provinces under the empire the years were often reckoned from the accession of the reigning emperor, his second year being made to begin on the first new year's day after his accession. The day which served as new year's day for this purpose varied from district to district. The January new year was in fact confined to western Europe.

Indictions.—The Cycle of the Indiction, a non-astronomical cycle of 15 years, is first mentioned in receipts for taxes collected in Egypt in A.D. 303 in respect of profits or produce of the fifth indiction (A.D. 301–302). It probably takes its origin in a provincial census for taxation following Diocletian's reconquest of Egypt in 297, a new census being taken every fifteen years. Each year in this cycle was regarded as a separate indiction. The earliest indictions appear to be reckoned from the Alexandrine new year, which fell generally on August 29, but, so long as it was strictly a financial year, the date from which the indiction was reckoned was frequently shifted according to the exigencies of public policy. The use of this cycle spread afterwards to other countries, where it was adopted as a means of designating years without special reference to public finance. There are various forms of the cycle, differing as to the day of their commencement. The Greek or Constantinopolitan indiction changed on September 1. The Roman indiction, which changes on December 25 or January 1, does not appear to be older than the 11th century.

The rule for finding the indiction corresponding to any year of the Christian era is: add 3 to the year and divide the sum by 15: the remainder (or 15 if exactly

divisible) is the Roman indiction or the Greek indiction up to the day of change; if the indiction beginning in any year is required, 4 instead of 3 must be added.

Jewish Calendar.—The ancient Jewish calendar was of the normal lunar type with twelve months, each of which began with the first visibility of the crescent Moon. Intercalation was performed when necessary by repeating the twelfth month, which in post-exilic times was known as Adar. The responsibility for intercalation rested with the public authorities, and in the early centuries of the Christian era was vested in the Sanhedrin, regard being had to the progress of crops and stock with a view to the proper celebration of the Passover, which fell in the first month. The months are most commonly designated in the Old Testament and Apocrypha by their numerical order, which is always counted from the spring month of Abib or Nisan. Originally the months had the same names as are found on Phœnician inscriptions, but in post-exilic times these were replaced by the Babylonian names. There are, however, references in the Hebrew Scriptures to the end of the year which would imply an autumn new year. This would be the agricultural year beginning with the autumn ploughing and ending with the vintage. In the book of Nehemiah regnal years are reckoned from the autumn month of Tishri, though everywhere else in the Old Testament they are reckoned from Abib or Nisan. Both beginnings of the year seem to be found in the Apocrypha, although as has been seen the months are always numbered from Nisan. In the last centuries before the Christian era the autumn new year was well established in Syria, and the reckoning of the year from Tishri is probably due to Syrian influence.

The papyri belonging to the Jewish colony at Elephantine in Southern Egypt in the fifth century B.C. show that at that place the beginning of the month was reckoned from the first evening when mean sunset or 6 p.m. followed mean new moon, so that we have a calendar determined by astronomical calculation, not by astronomical observation. There is, however, no reason to suppose that the Elephantine custom extended to Palestine. At Elephantine as in Palestine intercalation appears to have been irregular. The regnal years are reckoned from Nisan although the papyri are contemporary with Nehemiah who reckons such years from Tishri.

This empirical calendar has been superseded by one based on fixed rules, in which nothing is left to observation or discretion. The date when the modern calendar was designed is unknown, but it is commonly assigned to the fourth century of our era. This calendar is based on a rigorous determination of the mean new moon of Tishri, in which Cidenas' value for the mean lunation is used. Intercalation is governed by a 19-year cycle, and so the mean duration of the calendar year is the same as that which was adopted at Babylon in 383 B.C. The actual beginning of the calendar Tishri is obtained from the mean new moon by complicated rules which are designed to prevent certain solemn days from falling on inconvenient days of the week. The effect of these rules is that a common year may contain 353, 354 or 355 days, and an embolismic or leap year 383, 384 or 385 days. Ten of the months have fixed durations, the other two varying according to the requisite length of the year. The intercalary month always contains 30 days. It is placed next before the month Adar whose name and place it usurps. Adar itself becomes the second Adar or Veadar, and retains its normal length of 29 days.

The Jews now employ an era of the creation, whose epoch is taken as October 7 3761 B.C.

The Week.—At Babylon the king appears to have avoided the performance of acts of state on the 7th and 14th days of each month, and particularly on the 19th day, which may have been regarded as the seven times seventh day of the previous month. The Mosaic law enjoined a general abstinence from work on each seventh day, which was called the Sabbath. It has been suggested that the Hebrew periods of seven days may have been reckoned originally from the beginning of each month, but this is only surmise. When we come upon clear evidence, the period of seven days was reckoned independently of the month and in fact of all astronomical periods. From

the Jewish church it has passed into the Christian, in which special veneration is paid to the first day of the week, or Lord's Day (*κυριακή*, Dominica, dimanche).

Quite independently of the Jews there arose not long before the Christian era a group of astrological periods of seven hours, seven days, seven months and seven years. According to Cassius Dio the astrological period of seven days was of Egyptian origin, and as it was based on the Egyptian practice of dividing the day and night separately into twelve hours, there is every reason to believe that his statement is correct. The seven planets including the Sun and Moon were arranged in the order of their supposed distance from the Earth, according to the theory which was current in Hellenistic Egypt:—Saturn, Jupiter, Mars, Sun, Venus, Mercury, Moon. Each of these in turn was supposed to control one hour, and the planet which controlled the first hour of the day, month or year was regarded as the regent of that day, month or year. A day of 24 hours, therefore, included three periods of seven hours and three hours of a fourth period, and the regent of each day would be removed by three places in the order of the planets from the regent of the preceding day. There was thus obtained the following series of regents of the days:—Saturn, Sun, Moon, Mars, Mercury, Jupiter, Venus. These planetary days acquired a rapid and world wide popularity, while the planetary hours, months and years interested none but astrologers. The first reference to a planetary day is in a poem by Tibullus written between 30 and 26 B.C. Although the planetary week began originally with the day of Saturn, the day of the Sun soon came to be more commonly regarded as the first of the week, partly, no doubt, because it coincided with the first day of the Jewish week. But the planetary hours continued to be enumerated from the hour of Saturn. Although there has been universal agreement in the attribution of individual days to individual planets, there has been no such agreement in the attribution of nights and hours. In the Teutonic languages the names Tiu, Woden, Thor and Freya of the Teutonic divinities with whom Mars, Mercury, Jupiter and Venus were respectively identified have taken the place of their Roman counterparts. But, while the planetary names for the days of the week have established themselves throughout western Europe, they are not in use among oriental Christians.

Ecclesiastical Calendar.—The Christian church has continued the Jewish festival of Passover, which as a Christian festival has received in our language the name of Easter. In Greek and Latin the identity was maintained by the use of the same name Pascha. According to Christian teaching the sacrifice of the Passover, which had been celebrated on Nisan 14, was fulfilled in the sacrifice of Christ. According to the Mosaic law the sacrifice of the Passover on Nisan 14 had been followed by a feast of seven days lasting till Nisan 21. The Christian churches in Asia Minor largely retained the Mosaic rule and celebrated Easter on the Jewish Nisan 14 without regard to the day of the week. With a few unimportant exceptions the rest of Christendom celebrated Easter on a Sunday, selected so as to fall within the passover week. It is found that when the customs hardened, the Church of Rome observed the Sunday which was believed to fall not earlier than the 16th nor later than the 22nd day of the Moon, that of Alexandria the Sunday which was believed to fall not earlier than the 15th nor later than the 21st day of the Moon, while the British churches observed the Sunday which was believed to fall not earlier than the 14th nor later than the 20th day of the Moon. There was heated controversy between the churches of Rome and of Asia Minor on this subject in the second century. In the third century Christian churches, refusing to accept the authority of the Jewish councils to decide which month was to be regarded as Nisan or on which day it was to begin, began to construct tables of their own for computing the 14th day of the Easter month and the date of Easter. Two cycles, dating from the latter part of the third century, obtained a wide currency, the Roman cycle of 84 years and the Alexandrine of 19 years.

The Alexandrine cycle was simplicity itself. March 21 of the Julian calendar was regarded as the date of the vernal equinox, and all Alexandrine, and therefore all Julian years, were treated as of equal duration. The cycle was made to begin in the

year which placed a new moon on the Alexandrine new year's day, August 29-30, and which, in consequence, gave April 5 as the date of the 14th day of the Easter moon. This 14th day was placed 11 days earlier in each year than in the preceding year when this could be done consistently with its not falling before March 21. Where this was impossible, it was placed 19 days later than in the preceding year. Finally, in passing from the 19th to the 1st year of the cycle, an interval of 12 days instead of 11 was allowed, so as to bring the 14th day in the 1st year of the next cycle back to April 5. Easter day was the first Sunday after the 14th day of the Easter moon. This calendar assumed the same mean length of the year and the lunar month as the Callippic cycle and was therefore subject to the same errors. Its authors can hardly have expected it to remain uncorrected for many cycles. As a cycle it was subject to the inconvenience that it took 532 years for the whole series of Easter dates to recur.

The Roman cycle of 84 years was made to begin in a year in which a new moon fell on the Roman new year's day, January 1, and also on the Sabbath (Saturday). It made 84 tropical years equal to 1039 lunations and to 30681 days. The correct length of 84 tropical years was 30680.36 days, and of 1039 lunations 30682.29 days, so that the equinox fell 0.64 days earlier as compared with the assumed date every 84 years, and the new moons 1.29 days later as compared with the assumed dates in the same interval. The error in the length of the year was the same as in the Alexandrine cycle, but the error in the length of the lunation was nearly five times as great as in the Alexandrine cycle and was in the opposite direction. A further difference arose from the facts that the Roman rule treated the 16th, while the Alexandrine treated the 15th day of the moon as the earliest date for Easter, that the Roman rule accepted a 14th day of the month even if it fell before the equinox, so long as the resultant Easter fell after the equinox, and that the Roman rule regarded April 21 as the latest date for Easter, while the Alexandrine rule permitted it to fall as late as April 25. During the fourth and the first half of the fifth centuries differences between the two calendars were often, but not always, settled as they arose by agreement between the Roman pope and the patriarch of Alexandria, but long before the end of the fourth century the concessions had come to be all on the Roman side.

In 325 the General Council of Nice dealt with the date of Easter. Its decision is expressed in its epistle to the Church of Alexandria :—" We also send you the good news concerning the unanimous consent of all in reference to the celebration of the most solemn feast of Easter, for this difference also has been made up by the assistance of your prayers, so that all the brethren in the East, who formerly celebrated this festival at the same time as the Jews, will in future conform to the Romans and to us and to all who have from of old kept Easter with us."

A cycle of 532 years based on the 19-year cycle was composed by Victorius in A.D. 457 at the request of the Pope. It agreed with the Alexandrine cycle in the mean lengths of the year and month, but there were minor differences, which from time to time gave different dates for Easter. The papal Curia did not hold itself bound to any of the three cycles, and local usage varied. Easter was last celebrated at Rome according to the 84-year cycle against both the Alexandrine and the Victorian cycles in A.D. 501.

The Alexandrine cycle found a capable exponent at Rome in the person of Dionysius Exiguus, about A.D. 530. He constructed an Easter table extending from A.D. 532 to A.D. 626, in which he introduced for the first time the years of the Christian era, which was adopted from him by Bede and from Bede by western Christendom generally. The only part of the furniture of a late mediæval Easter table which was not used by Dionysius was the solar cycle, which would appear to have been first used by Maximus Confessor in Africa in A.D. 641.

The British and Irish churches continued to use the 84-year cycle in a form which permitted Easter to fall as early as the 14th day of the moon and which used

March 25 as the earliest possible date of Easter. But at the Synod of Whitby in A.D. 664 King Oswy of Northumbria under the influence of Wilfrid decided to adopt the Dionysiac system. The decision was accepted by the other English communities, and Bede, the Northumbrian church father, was brought up to the use of the Dionysiac system. His *De temporum ratione*, written in 725, included not merely an exposition, but an Easter table for the 532 years from A.D. 532 to 1063, and rapidly became the standard treatise on the subject. Before the end of the eighth century the 84-year cycle had been abandoned by the last of the British churches, and even in France the Victorian cycle had given way to the Alexandrine.

Gregorian Calendar.—As the centuries advanced, the gradual shifting of the calendar dates of the seasons did not escape attention. In fact in 11,000 years or so January would have ceased to be a winter month. Dante* refers to this as follows:—

Ma prima che gennaio tutto si sverni,
per la centesima ch'è laggiù negletta ;

“ But, ere that January be all unwintered by that hundredth part neglected upon earth.”

The hundredth part is here the difference between the mean calendar year of 365·25 days and a supposed tropical year of 365·24 days.

The defect of the calendar in the sixteenth century showed itself mainly in its effect on the date of Easter, since the tables in use placed both the vernal equinox and the Easter full moon, or more exactly the 14th day of the Easter moon, later than their true dates. Accordingly in 1582 Pope Gregory XIII published a bull instituting a revised calendar. He considered it desirable to restore the vernal equinox to the position assigned to it in the Easter tables, namely March 21, and accordingly ordained that the day after 1582 October 4 should be called October 15. In future the intercalary day, which in the Julian calendar was inserted once every four years, was to be dropped in those centurial years that were not divisible by 400. Thus 1600 and 2000 were to be leap years, but not 1700, 1800, 1900. The effect of this was to make the mean length of the year 365·2425 days, a duration which was approximately correct for the time of Julius Cæsar, but which is slightly in excess of the present length of the year. The reform has the merit of treating the simple Julian system as correct for one or two centuries at a time and making corrections in centurial years only. The same simplicity marked the new treatment of the lunar month. The dates of the Easter full moons were put back three days, or advanced seven days if we include the reduction to the Gregorian year. If this involved placing the 14th day of the Easter moon later than April 19, the full moon of the previous lunation was accepted, so that the date of the Easter moon was put back 23 days in the calendar. If the shift involved placing the 14th day of the moon on April 19 it was placed on April 18 instead.

A similar shift was to be made in centurial years, if required. There was to be a forward shift of one day in every centurial year which was not a leap year, and a backward shift of one day in 8 out of every 25 centurial years. This backward shift was to be made for the first time in 1800, then at seven intervals of 300 years and one of 400 years, and so on. If a backward and forward shift were due in the same centurial year the dates of the full moons were to be the same in each year of the 19-year cycle as in the preceding century. The calendar was to be worked as if the dates of full moon for each year of the cycle were to range from March 21 to April 19 inclusive, except that all full moons which should have fallen on April 19 were to be put back to April 18, and, whenever this was done, a full moon which was due for April 18 in another year of the cycle was to be put back to April 17. The object of this exception was to retain April 18 as the last possible date for the Easter full moon.

* *Paradiso*, XXVII, 142, 143.

But transferences of full moon dates under this exception do not affect the subsequent dates of full moon for the particular place in the 19-year cycle. Thus the full moon of the 14th year of the cycle which in the unreformed calendar had stood on April 12 was placed on April 18 after the reform and not on April 19, but the forward shift of one day in 1700 brought it to March 21 as if it had been on April 19. Similarly the full moon of the 6th year was shifted in 1700 from April 17 to April 18, but in 1900 it remained at April 18 instead of being shifted to April 19. The result of this was that the full moon of the 17th year which should have been shifted to April 18 in 1900 remained at April 17. Its next forward shift will be to April 18, taking the place of April 19, and then to March 21. The effect of this exception is that every full moon date gets two turns either on April 17 or on April 18, so that although the total range of full moon dates is only 29 days inclusive, it takes 30 forward shifts to bring the full moons back to their former positions.

Altogether 5,700,000 Gregorian years are made equal to 70,499,183 lunations and to 2,081,882,250 days, so that the mean length of the lunation is taken as 29.5305869 days, a value which is in error by the millionth part of a day at the present moment, but will be correct in the course of 300 years. Since 400 Gregorian years contain 146,097 days or 20,871 weeks, the days of the week recur on the same days of the year every 400 years, and there should therefore be a recurrence not only of Easter full moons, but also of Easter Sundays, after the lapse of a complete cycle of 5,700,000 years.

This calendar combines the merits of extreme accuracy in its mean values with extreme simplicity in its application, since for a period varying from one to three complete centuries it is able to determine the date of full moon as if all calendar years were of equal duration and as if the 19-year cycle were exactly applicable, so that a table as simple as that used for the unreformed calendar will hold good for that length of time. The calendar is independent of differences of meridian. It makes the moon full on one particular day for the whole world without specifying any particular moment. The astronomical Full Moon takes place at a particular moment, which will fall on different calendar days according to the meridian selected, being more often than not on a different calendar day in Australia and in Canada. The time of astronomical Full Moon is also affected by inequalities in the motion of the Sun and Moon. The calendar full moon is not affected by these inequalities, just as the time used in civil life is not affected by inequalities in the length of the day. It follows, therefore, that the simple tables of the Prayer Book and the elaborate tables used in H.M. NAUTICAL ALMANAC Office must occasionally differ in their final results.

The Gregorian calendar was adopted in Italy, France, Spain, Portugal and Poland in 1582, by most of the German Roman Catholic states and by Holland and Flanders in 1583, and by Hungary in 1587. The adoption in Switzerland was gradual; it began in 1584 and was completed in 1812. The German and Dutch Protestant states generally, along with Denmark, adopted it in 1700, the British dominions in 1752, Sweden in 1753, Japan in 1873, China in 1912, Bulgaria in 1915, Turkey and Soviet Russia in 1917, Yugoslavia and Romania in 1919, and Greece in 1923. The rules for Easter have not, however, been adopted by those oriental churches which are not subject to the papacy, although the Orthodox Greek Church has so far abandoned the older rules as to permit the date to be settled temporarily by direct ecclesiastical authority.

The German Protestants, in adopting the Gregorian calendar, did not adopt the Gregorian rules for the computation of Easter, but enacted that both the date of the equinox and the date of the Easter full moon should be determined astronomically with the Rudolphe tables and the meridian of Uranienborg (in the island of Hveen between Denmark and Sweden). This astronomically determined Easter was used by the German Protestants from 1700 to 1776 and by the Swedes from 1740 to 1844.

In the British dominions the change of calendar was effected by giving the name September 14 to the day after September 2 in 1752. The difference between the

Julian and Gregorian calendars, which was 10 days in 1582, is now 13 days, but the Alexandrine and Gregorian Easters may be as much as 5 weeks apart.

It is provided by the Easter Act, 1928, that "Easter-day shall, in the calendar year next but one after the commencement of this Act and in all subsequent years, be the first Sunday after the second Saturday in April." The Act is to commence and come into operation on a date to be fixed by Order in Council, but no such Order in Council is to be made until a draft order has been approved by resolution by both Houses of Parliament "either without modification or with such modifications to which both Houses agree." Before making such draft order, regard is to be had to any opinion officially expressed by any Church or other Christian body. The Act is to extend to the United Kingdom, the Isle of Man, and the Channel Islands, and may be extended by Order in Council to any other part of His Majesty's dominions with the exception of the self-governing dominions and their dependencies. The effect of these provisions is to expedite procedure, but to postpone final decision on the change in the calendar.

Differences of Style.—The Christian era invented by Dionysius Exiguus and popularised by Bede has been adopted at different times and in different countries with different initial days for the year. The most common initial dates have been December 25, January 1, March 1 and March 25. These different reckonings of the year were known as *styles*. Thus in late mediæval Italy in the Venetian style the years of the Christian era began on March 1, in the Pisan style on the preceding March 25, and in the Florentine style on the following March 25, while at Rome different styles were used for different purposes. In England the Nativity style beginning on December 25 was superseded in the fourteenth century by the Annunciation style (commonly called old style) beginning on March 25, but the Circumcision style (or new style) beginning on January 1 was substituted in 1753 by the Act which introduced the Gregorian calendar. In Scotland the year had begun officially on January 1 since 1600. The names old style and new style have, however, come to be used specially to distinguish not the different dates for the beginning of the year, but the Julian and Gregorian calendars, each of which has been used with different initial dates.

In the classical languages the numerical designation of years is always by ordinal numbers, so that the Christian era begins with the beginning of the year 1 or of the first year. The year immediately preceding is the year 1 B.C. or the first year before Christ. The year before 1 is styled 0 by astronomers, and the preceding year is -1, corresponding to 2 B.C. in the usage of historians. Therefore in converting years B.C. into astronomical dates it is necessary to subtract 1 and to prefix the minus sign. In converting negative astronomical dates into years B.C. it is necessary to remove the minus sign and to add 1 to the number of the year.

Sunday Letter, Solar Cycle, Golden Number, Epact.—The Roman calendar makers were accustomed to place the letters A, B, C, D, E, F, G and H in rotation against the days of the year. At first these letters referred to the Roman market week of eight days. Then if the first market day in any year were known, as for instance January 5, the letter E standing against that day would indicate all the market days in the year. The next device was to use the same series ending with G to indicate the seven days of the planetary week, which coincides in practice, though not in origin, with the Christian week. The letter which stands against the Sundays in any year is known as the *Sunday Letter* or *Dominical Letter* of that year. Since no letter is placed against the intercalary day, it follows that in leap years the Sunday Letter retrogrades by one place at the date of the intercalation. Thus in 1932 C will be the Sunday Letter in January and February, and B from March onwards. As the ordinary year contains 52 weeks and 1 day, the Sunday Letter also retrogrades one place at the beginning of each year. The series of letters has always been made to begin on January 1 as in the pre-Christian *Fasti*, whatever day may have been adopted for the beginning of the civil year.

In the Julian calendar the days of the year recurred on the same days of the week in 7×4 years, thus giving rise to the so-called *Solar Cycle* of 28 years, which could be used for the purpose of finding the day of the week for any day in a known year. The years of this cycle are commonly shown in almanacs, but it has been very little used in practice. There is mention in the Talmud of a 28-year cycle, at the close of which the vernal equinox, supposed to recur at intervals of $365\frac{1}{4}$ days exactly, would return both to the same planetary hour and to the same day of the week. The beginning of each 28-year cycle is still observed by the Jews, but has ceased to have any calendrical or astronomical significance. As has been seen above the solar cycle for correlating the week with the Julian calendar appears to have been first used by Maximus Confessor in A.D. 641. Supposed older works which mention this cycle have probably been misdated.

The tables for finding Easter according to the Alexandrine calendar tabulated the days from March 21 to April 18 and placed against each day the number of the year in the 19-year cycle in which the Easter full moon would fall on that day. The numbers so tabulated have from the later middle ages been known as *Golden Numbers*. The same tables placed against each day its Sunday Letter. So that to find the date of Easter all that was required was to see against which day the Golden Number of the year stood and then to see which was the next day against which the Sunday Letter of the year stood. The day so found would be Easter Day. This method is retained in the English Prayer Book, but the positions of the Golden Numbers have to be changed in the centurial years whenever the date of the Easter full moon corresponding to a given year of the 19-year cycle is changed.

In the tables issued by authority of Pope Gregory XIII, Easter is found by means of *Epacts* instead of by Golden Numbers. The Epact is the age of the moon on some fixed day of the calendar year. In the Alexandrine Easter tables the age on the first day of the Alexandrine calendar (August 29-30) was shown. Dionysius Exiguus and Bede, writing for a western public, preferred to describe this as the moon's age on March 22. Tables adapted to the Roman cycle of 84 years showed the moon's age on the first day of the Roman year, January 1. So also do the tables adapted to the Gregorian calendar. If the moon's age on the first day of the year is known, then by counting months of 30 days and 29 days alternately, the approximate age of the moon is known for every day of the year. The epacts in the Easter calendars vary in the same manner as the Golden Numbers. The English Prayer Book shows the epact, but makes no use of it.

Julian Period.—The French Protestant scholar and chronologist Josephus Justus Scaliger invented the Julian Period as a practically continuous measure of time. It combines the Solar Cycle of 28 years, the Lunar Cycle of 19 years and the Cycle of the Indiction comprising 15 years, thus containing $28 \times 19 \times 15 = 7980$ years altogether. All these cycles are supposed to begin on January 1 of the Julian calendar, and it is found that they began together in 4713 B.C., so that one Julian Period includes all dates both in the past and in the future to which reference is likely to be made, and to that extent has an advantage over an era whose epoch lies within the limits of historical time.

The years of the Julian period are seldom employed now, but the day of the Julian period is frequently used in astronomy and in calendrical tables. It is the only method of enumerating days which is free from their combination into months and years, and is therefore particularly useful where an exact interval in days is required. The Julian days are numbered consecutively from Greenwich mean noon on January 1 4713 B.C., at which date the Julian Day was 0.0.

Mohammedan Calendar.—The Mohammedans use the Era of the Hegira beginning with the year of Mohammed's flight or Hegira in A.D. 622. The peculiarity of the Mohammedan calendar is that each year consists of 12 lunar months without intercalation, so that each month goes the round of the seasons in 33 years. For religious purposes the beginning of each month is fixed by observation of the lunar

crescent. For the purposes of civil life there has never been an exact rule, and different beginnings of the month have been used by different people living in the same town. It is, therefore, impossible to give an exact interpretation to a date expressed in this calendar unless the day of the week is given as well as the day of the month. This applies both to public and to private documents. For astronomical purposes a more exact rule is followed. The months have 30 days and 29 days alternately, except the 12th month, which has 29 days nineteen times and 30 days eleven times in a cycle of 30 Mohammedan years. In consequence the calendar makes 360 lunations equal to 10631 days. Their real duration is 10631.012 days. The error, therefore, amounts to no more than a day in 2500 years.

TIME

The astronomical clock, by means of which time is measured, is the Earth, whose axial rotation causes the heavenly bodies to appear to revolve round the Earth from east to west. For the hands of this clock the Sun, Moon or stars may be selected, and different times will result according to the choice made. The most convenient unit of measure for time is the day, which is defined as the interval between successive transits over the same meridian of the heavenly body by which the time is measured. If the heavenly bodies were absolutely fixed, all days would be of the same length, this length corresponding exactly to the Earth's period of rotation. But the movements of the various heavenly bodies or other reference points are different and non-uniform, and consequently days of different and varying length arise.

The **apparent solar day** was formerly considered to begin and end at **apparent noon**, the moment when the centre of the true Sun is on the upper meridian, but since 1925 January 1, it has been considered to begin and end at apparent midnight, the moment of lower meridian passage of the true Sun. It is divided into 24 hours, and the time resulting is called **apparent time**. Thus apparent time at any instant is the westward hour angle of the true Sun + 12^h.

Owing to the non-uniform motion of the true Sun in right ascension, arising partly from the fact that it moves in the ecliptic and not in the equator, and partly from the eccentricity of the Earth's orbit, the apparent solar day is of variable length, and is therefore not suitable as a measure of time, because the clocks made by man to record time are, of necessity, designed to move uniformly. Hence a fictitious mean sun is conceived which moves uniformly in the equator and, in the long run, is as much ahead of the true Sun as behind it. The interval between successive transits over the same meridian of this mean sun constitutes the **mean solar day**, which is the common day of civil life, and gives rise to **mean solar time**, or more simply **mean time**.

As the mean sun crosses all the meridians on the earth at different moments of absolute time there arise numerous **local mean times**, each defined by the passage of the mean sun across a particular meridian. To avoid the confusion that would ensue if these were all in use it is convenient to regard the time of some one meridian as a standard. By common consent the meridian of Greenwich is universally accepted as the prime meridian, and **Greenwich Mean Time**, usually abbreviated G.M.T., is the standard to which all other mean times are referred. Since the Earth rotates uniformly on its axis, and since longitudes are measured uniformly round the Earth from the meridian of Greenwich, it follows that the difference between Greenwich mean time and the local mean time of any place is equal to the longitude of that place. Denoting by λ the longitude, considered positive to the west, we have, since the Earth rotates from west to east,

$$\text{Local mean time} = \text{G.M.T.} - \lambda$$

In actual practice it would be extremely inconvenient if local mean times were adopted by each community, so the time over a large area is reckoned from some one convenient meridian, and called the **Standard Time** for that area or country. Usually the standard time differs from Greenwich mean time by an integral number of hours. A list of the standard times adopted by the principal countries of the world is given on pages 696-703. In some countries the legal time during the summer months is in advance of the standard time, and is then usually designated **Summer Time**. This time is, however, never used in astronomical ephemerides, or in the recording of astronomical observations.

In the case of a vessel at sea the term **Ship Mean Time** is frequently used instead of **Local Mean Time**. This must not be confused with **Ship Time**, which is the time shown by the ship's clocks. In the merchant and passenger services it is customary to alter the clocks each night by an integral number of minutes so that at local noon on the following day the ship time shall be approximately 12^h. In the British Navy **Zone Times**, differing by integral hours from Greenwich mean time, are used. Each zone extends for 7°·5 or 30^m on both sides of the meridian from which it takes its name. Thus all vessels between longitudes 22°·5 and 37°·5 west would use the zone time + 2^h, i.e. G.M.T. - 2^h.

— Before 1925 January 1 the astronomical day was considered to begin at mean noon, or at the moment of upper meridian passage of the mean sun, and astronomical clocks indicated 0^h at that moment and 12^h at mean midnight. Greenwich mean time was then usually defined as the Greenwich westward hour angle of the mean sun. Since that date, however, the day has been considered to begin at mean midnight, or the time of lower meridian passage of the mean sun, and the definition of Greenwich mean time has been changed so that it is now the Greenwich hour angle of the mean sun + 12^h. Thus the astronomical day 1924 December 31 was only 12 hours long and 1924 December 31·5 old time reckoning is the same as 1925 January 1·0 new time reckoning. Since, as far as the NAUTICAL ALMANAC is concerned, no change of name has been made, but merely a change of definition, it is highly important that in expressing all times prior to 1925 January 1 the old definition should be the only one permitted, while in the case of times since that date the new definition should be followed rigorously. It has been felt by some astronomers that a new name should be given to the time commencing at midnight, and in the *American Ephemeris* and the *Connaissance des Temps* the term **Greenwich Civil Time** (G.C.T.) is used, in the *Berliner Jahrbuch Weltzeit* (World Time), while a number of astronomers have adopted **Universal Time** (U.T.). For cases where it is desired to express a time after 1925 January 1 by the former method of reckoning, the term **Greenwich Mean Astronomical Time** (G.M.A.T.) is now reserved.

The difference between the right ascension of the true Sun and that of the mean sun is known as the **equation of time**. This quantity is also the difference between the hour angles of the two bodies, and between mean and apparent time. When this term was first introduced it was the practice to determine apparent time from a sun-dial, or from observations of the Sun, so that the equation of time was then considered to be mean *minus* apparent time, or the correction to be applied to apparent time to reduce it to mean time. To-day mean time is ascertained by the astronomer by conversion of the sidereal time obtained from stellar observations, and by the navigator from wireless signals, so that the NAUTICAL ALMANAC now tabulates the correction to be applied to mean time to give apparent time.

The interval between two successive passages over the meridian of any place of an equatorial star without proper motion constitutes the **sidereal day**, properly so-called. This interval is 23^h 56^m 04^s·100 of mean solar time, and equals, of course, the period of the Earth's axial rotation. But in actual practice transits, not of a star, but of the position of the vernal equinox or first point of Aries, are used to define the sidereal day. Since the equinox has an annual retrograde motion along the ecliptic of about 50", due to precession, the adopted sidereal day will be 0^s·009 shorter than

the period of rotation, and is, therefore, $23^{\text{h}} 56^{\text{m}} 04^{\text{s}}.091$, measured in mean solar time. From this figure the mean solar day is easily deduced to be $24^{\text{h}} 03^{\text{m}} 56^{\text{s}}.555$ of sidereal time. A sidereal clock, showing **sidereal time**, will indicate 0^{h} at the moment of passage of the vernal equinox, and will divide the sidereal day into 24 sidereal hours.

The **right ascension** of a body may be defined as the interval, measured in sidereal time, between the transit of the vernal equinox and the transit of the body. In other words, when the body is on the meridian, the sidereal time is equal to its right ascension. Applying this principle to the mean sun it follows that the sidereal time at the moment of meridian passage of the mean sun, which, by definition, is mean noon, is equal to the right ascension of the mean sun. Thus it is essentially a knowledge of the right ascension of the mean sun which permits the conversion of mean time into sidereal or vice versa. At mean midnight the sidereal time is obviously 12^{h} greater than the right ascension of the mean sun, and in the NAUTICAL ALMANAC this right ascension, increased by 12^{h} , is given for every midnight or 0^{h} under the heading "Sidereal Time." The sidereal time at any moment may be found by adding the equivalent in sidereal time (taken from Table III) of the mean time to the sidereal time at 0^{h} . The inverse problem may be solved by subtracting the sidereal time at 0^{h} from the given sidereal time, and converting the remainder into mean time by Table IV.

An alternative method of conversion is afforded by the tabulation of the mean time of **transit of the first point of Aries**, which is computed by converting the complement to 24^{h} of the sidereal time at 0^{h} into its equivalent interval of mean time. The conversion of mean to sidereal time may be effected by subtracting the time of previous transit from the given mean time, and converting the remainder into its equivalent interval of sidereal time (Table III). A given sidereal time may be converted into an equivalent interval of mean time (Table IV) and added to the *preceding* transit of the first point of Aries to yield the corresponding mean solar time.

A complication is introduced by the fact that the precession of the equinoxes is not uniform, but is affected by irregularities known as **nutation**, due to solar and lunar perturbations. The **mean equinox** of date is conceived to be a point moving uniformly (except for a slight secular acceleration) along the equator, while the difference in right ascension between this point and the true equinox (in the sense true — mean) is called **nutation in right ascension**. This may amount to about $\pm 1^{\text{s}}.2$. The right ascension of the mean sun is measured from the true equinox, and hence does not increase uniformly, nor are the sidereal days, measured by transits of the true equinox, of equal length. This is illustrated by a table showing the sidereal time at 0^{h} at intervals of 90 days.

Date	Sidereal Time at 0^{h}
1931 Jan. 5	$06^{\text{h}} 54^{\text{m}} 29^{\text{s}}.83$
Apr. 5	$12^{\text{h}} 49^{\text{m}} 19^{\text{s}}.83$
July 4	$18^{\text{h}} 44^{\text{m}} 09^{\text{s}}.95$
Oct. 2	$00^{\text{h}} 38^{\text{m}} 59^{\text{s}}.96$
Dec. 31	$06^{\text{h}} 33^{\text{m}} 50^{\text{s}}.08$

The nutation is, for convenience, usually divided into two parts. One part, depending on the longitude of the Moon's node, the Sun's longitude and the longitude of the Sun's perigee, is called the long-period terms, while the other, involving functions of the Moon's longitude, is called the short-period terms. The long-period terms have a principal period of 18 years and vary between $\pm 1^{\text{s}}.2$; the principal

short-period term has a period of half a lunar month, or nearly 15 days, while the combined effect of these short-period terms may attain $\pm 0^s.020$. At present the NAUTICAL ALMANAC omits the short-period terms when giving the sidereal time at 0^h , although in 1933 they will be included and the time given to three places of decimals.

Just as the introduction of clocks led to the necessity for mean solar time, so will the accurate time-keeping of modern clocks lead, in the not far-distant future, to the use of a mean or **uniform sidereal time**, related to the true sidereal time as determined by transit circle observations of stars by the equation :—

$$\text{Uniform sidereal time} = \text{true sidereal time} - \text{nutaton.}$$

The following table shows the analogy between solar and sidereal times :—

		Solar		Sidereal
Observations determine	..	Apparent solar time	..	True sidereal time
Clocks keep	.. ..	Mean solar time	..	Uniform sidereal time
The difference is	.. ..	Equation of time	..	Nutation in R.A.

To facilitate the use of uniform sidereal time the nutation in right ascension is now tabulated for every day, to three decimals, and includes the short-period terms. The mean time corresponding to a given uniform sidereal time is the mean time equivalent of (Given uniform sidereal time — true sidereal time at 0^h + nutation at 0^h).

All ephemerides are computed on the assumption that time moves uniformly, and that the length of a day, whether mean solar or uniform sidereal, is invariable, except for a small recognised secular variation. It is now believed that the rotation of the Earth, upon which the length of the day depends, is not constant. Such a change, although imperceptible from day to day, would lead to a cumulative error in time reckoning, so that the observed time as shown by a clock might differ by many seconds from the time which the compilers of the tables of the Sun, Moon and planets expected the clock to show at a given moment of absolute time, the effect of this error being revealed, not as an apparent clock error, but as an apparent error in the ephemerides of the Sun, Moon and planets. It was the correlation of these apparent errors that led to the announcement of the variability of the Earth's period of rotation.

EQUINOXES

The **vernal equinox**, or **first point of Aries**, is defined as that intersection of the equator and ecliptic through which the Sun passes when crossing the equator from south to north. On account of the movements of the equator and ecliptic the equinox is continually shifting. Its movement may be resolved into two portions, one of which, known as **precession**, causes the equinox to retrograde along the ecliptic or equator at a nearly uniform rate, while the other, known as **nutaton**, causes a periodic displacement of the equinox from the position that it would have if affected by precession alone. When the effect of nutation is removed the resulting fictitious equinox is called the **mean equinox**. Its instantaneous position at any moment of time is the **mean equinox of date**, while its position at the beginning of the Besselian fictitious year is known as the **mean equinox of the beginning of the year**, or, more briefly, for the year 1931, the **mean equinox of 1931.0**. The intersection of the true equator and ecliptic is the **true or apparent equinox**.

Since nutation arises from the action of the Sun and Moon on the Earth, it does not affect the position of the ecliptic, but only that of the equator, and consequently nutation does not affect the latitudes of heavenly bodies. The ecliptic is, however, not fixed in space, but changes its position slowly on account of the action of the other planets on the Earth's orbit. Since the ecliptic is the fundamental

plane to which other planes in the solar system are referred, the ecliptic of any one date must be referred to the position of the mean ecliptic of some specified date. The ascending node of the ecliptic of the instant $t + dt$ on the ecliptic of the instant t is the quantity denoted in these pages by π (approximately 174°), while the annual change in the inclination of the moving ecliptic to its fixed position at some instant is π (approximately $0^\circ.471$). The term true ecliptic, which would denote the instantaneous orbit of the Earth round the Sun, is not used.

The inclination of the ecliptic to the equator, known as the **obliquity** of the ecliptic, varies on account of the combined movements of these two planes, and, as we have just seen, the movement of the equator is affected by nutation, so that we introduce the idea of a mean equator, and hence of a mean obliquity, a mean obliquity of date, a mean obliquity for the beginning of the year, and a true or apparent obliquity, as in the case of the equinox. The difference true obliquity *minus* mean obliquity of date is the **nutation in obliquity**. The **nutation in longitude** is the arc of the ecliptic intersected between the mean and the true equators, and is given in the sense in which such quantities are usually given in astronomy, i.e. as the correction to be added to a mean longitude to give apparent longitude. The **nutation in right ascension** will be equal to the nutation in longitude multiplied by the cosine of the obliquity, and reduced to time. The apparent obliquity and the nutation in obliquity are no longer tabulated directly in the NAUTICAL ALMANAC, but may be readily obtained as follows:—

Mean obliquity for beginning of the year, see page 54

Reduction to mean obliquity of date = $-0^\circ.468 \tau$

Nutation in obliquity, long-period terms = $-B$ (page 262)

Nutation in obliquity, short-period terms = $-B'$ (page 262)

It has been the practice to refer the solar, lunar, planetary and stellar ephemerides to the apparent equinox, so that they may be compared directly with observations. But in theoretical work, and in the intercomparison of observations, it is generally necessary to employ some fixed equinox. In this connection use is made of the mean equinox of the beginning of the year in such work as the determination of cometary orbits, and as an intermediate stage in the reduction of observations of stars to a form in which they can be combined. In the computation of cometary and minor planet perturbations, and in the combination of observations of star positions into a single catalogue it is necessary to go a stage further, and to adopt a few widely separated equinoxes. The equinox of 1950.0 has recently been suggested* as a standard equinox for the next fifty years or so. The Sun's longitude, latitude and equatorial rectangular co-ordinates are now given in each ALMANAC for that equinox. In the case of the planets, instead of publishing year by year the co-ordinates for the equinox of 1950.0, they will be issued in separate volumes, each covering twenty years. The volume for the years 1920-1939 is in preparation.

The ephemerides of minor planets, published by the Astronomisches Rechen-Institut of Berlin, are now for the equinox of 1925.0, but will shortly be changed to that of 1950.0. The steps taken by the national ephemerides to facilitate the adoption of the equinox of 1950.0 as a standard formed the subject of a special resolution of approval at the meeting of the International Astronomical Union at Leiden in 1928 July.

The position of a star, when referred to a specified mean equinox, is spoken of as the **mean position** for that equinox. In some cases the position is said to be for a certain equinox, but for a different **epoch**; this means that, when reducing to the specified equinox the position observed at the epoch, no correction for proper motion has been applied. Or, on the other hand, the position may have been taken from a catalogue, and a correction for proper motion deliberately applied so that

*L. J. Comrie, "The Use of a Standard Equinox in Astronomy," *M.N.R.A.S.*, 86, 618 (1926 June).

the position of the star, in so far as proper motion is concerned, is that appropriate to the epoch, whereas the axes of reference are those of the equinox specified. In mean positions of stars the effect of stellar aberration has always been removed.

The **apparent position** of a heavenly body is the position in which it would be seen by an observer, i.e. it has been corrected for precession and nutation, so that it is referred to the true equator and equinox of date; it has been corrected for stellar aberration, or, in the case of a body in the solar system, for planetary aberration; also it has been corrected for proper motion and, if necessary, for parallax. In the NAUTICAL ALMANAC the apparent positions of stars are corrected for annual parallax where this is known and is sensible. The ephemerides of the members of the solar system are geocentric, so that no correction for horizontal parallax requires to be included.

LONG-PERIOD AND SHORT-PERIOD TERMS

It has been the practice to divide nutational terms into long-period terms, which do not depend on the Moon's longitude, and short-period terms, which do. The reasons for this were first, that the short-period terms are small, being usually negligible in comparison with the probable error of a single observation, so that no systematic error is caused by their neglect. Secondly, the apparent places of stars are usually given at intervals of ten days, and the short-period terms cannot be interpolated at such wide intervals; consequently they are omitted, but means are provided for their inclusion when desired. The increased accuracy now attainable in meridian circle observations is resulting in the more frequent inclusion of these terms, especially in accurate time-keeping and longitude determination. No theoretical reason exists for the separation or exclusion of short-period terms; the treatment adopted has been solely a matter of convenience.

In the ephemerides of the Sun, Moon and planets short-period terms are omitted, and it is contemplated that this practice will continue for some years at least; as already remarked no systematic error is thereby introduced into the comparison of observation with theory. In any case the further corrections necessary could readily be computed from the functions tabulated on pages 271-285 by the formulæ

$$\begin{aligned}\Delta\alpha &= f' + \frac{1}{18}g' \sin(G' + \alpha) \tan \delta \\ \Delta\delta &= g' \cos(G' + \alpha)\end{aligned}$$

The corrections to the apparent places of the stars on pages 354-516 are more conveniently expressed in the form

$$\begin{aligned}\Delta\alpha &= A'a + B'b \\ \Delta\delta &= A'a' + B'b'\end{aligned}$$

A' and B' being given on pages 262-269, and a , a' , b and b' being tabulated for each star.

It must be noted that these terms are already included in the ephemerides of circumpolar stars on pages 304-353.

UNIT OF DISTANCE

The unit of distance in the solar system is the mean distance of the Earth from the Sun. Using Hayford's value of 3963.34 miles for the Earth's equatorial radius, and the adopted value of $8''.80$ for the Sun's equatorial horizontal parallax, this distance is 92,900,000 miles or 149,500,000 kilometres, the logarithms of which may be taken as 7.9680 and 8.1746 respectively.

VARIATIONS

The variation per hour of a tabulated quantity is the change that would take place in one hour if the instantaneous rate of change at the epoch for which the variation is given were maintained.

THE NAUTICAL ALMANAC

It is to be noted that in all cases, unless otherwise stated, or unless inconsistent with the headings of the page (e.g. Ephemerides at Transit at Greenwich) the quantities given are for 0^h G.M.T. on the dates concerned.

Calendar (Pages 1-5)

The special article on the calendar (page 734) and the explanation at the foot of page 2 may be consulted.

Sun (Pages 6-21)

The *Apparent Right Ascension* and *Apparent Declination* are referred to the true equinox of date and are affected by aberration and the long-period terms of nutation; they therefore represent the apparent position of the true Sun.

The *Semi-diameter* at unit distance is taken as 16' or $\cdot 18$. A smaller value (see page 768) is used in the computation of eclipses.

The *Equation of Time*, tabulated in the sense apparent *minus* mean, is the correction to be added to mean time to give apparent time.

The *Sidereal Time* is, at midnight, $12^h +$ the right ascension of the mean sun, affected by aberration, $+$ the long-period terms of nutation. Its use in converting a given mean time into sidereal time is illustrated in Table III, page 710.

In the NAUTICAL ALMANAC for 1933 and subsequent years the sidereal time will be given to three places of decimals, and will also include the short-period terms of nutation, in order that it may be used in connection with the very accurate time-keeping that is now possible. The combined effect of the short-period terms may attain $\pm 0^s \cdot 020$.

The *Sun's Longitude and Latitude* are referred to the mean equinox of the beginning of the year. The apparent longitude is equal to the longitude referred to the mean equinox of the beginning of the year $+$ precession in longitude $+$ nutation in longitude $-$ aberration. The apparent latitude is equal to the mean latitude $- 0^s \cdot 471 \tau \sin(\lambda - \pi)$, τ being given on pages 271-285, and π on page 54.

The *Radius Vector of the Earth* is the distance from the centre of the Sun to the centre of the Earth, measured in astronomical units.

The *Precession in Longitude* is the precession since the beginning of the Besselian fictitious year for a point on the ecliptic. For other points the further correction $+ 0^s \cdot 471 \tau \cos(\lambda - \pi) \tan \beta$ must be applied.

The *Nutation in Longitude*, which does not include short-period terms, is the correction to be added to a longitude referred to the mean equinox of date to give the longitude referred to the true equinox of date, which, when aberration has been subtracted, becomes the apparent longitude. It is independent of the latitude. The short-period terms are $+ 50^s \cdot 37 A'$.

The *Nutation in Right Ascension*, which includes short-period terms, is tabulated for use in connection with accurate time-keeping, as explained in the article on time (page 747). It is the correction to be added to the right ascension of a body in the equator (e.g. the mean sun) to reduce from the mean equinox of date to the true equinox of date. The effect of the short-period terms may be removed, if desired, by subtracting $3^s \cdot 081 A'$. For star reductions nutation is combined with precession, and computed by means of the Besselian or the independent day numbers.

The *Transit of the First Point of Aries* is the mean time of sidereal 0^h; or the moment when the true equinox is on the meridian. The effect of short-period terms, which may attain $\pm 0^s \cdot 020$, is not included. Its use in converting a given sidereal time into mean time is illustrated in Table IV, page 711.

Sun at Transit at Greenwich (Pages 22-29)

These pages give the apparent right ascension, apparent declination, horizontal and vertical semi-diameters of the Sun at apparent noon at Greenwich. The variations per hour of longitude enable a transit ephemeris of the right ascension and declination to be readily made for any other longitude.

Sun's Co-ordinates (Pages 30-37 and 46-53)

The *Sun's Equatorial Rectangular Co-ordinates* are given for every midnight, together with their first and second differences.

The axis of X is directed to the first point of Aries, the axis of Y to the point in the equator whose R.A. is 6^h , and the axis of Z to the north pole of the equator.

The co-ordinates on pages 30-37 are referred to the mean equator and equinox of the beginning of the current year. The reduction to the true equinox of date is not given, as co-ordinates referred to that equinox are no longer in use. Attention is drawn to the use of the Everett coefficients on page 727 for interpolating these co-ordinates.

The co-ordinates may be reduced to other equinoxes by the formulæ

$$\begin{aligned} X &= X_0 X_z + Y_0 Y_z + Z_0 Z_z \\ Y &= X_0 Y_z + Y_0 Y_z + Z_0 Z_z \\ Z &= X_0 Z_z + Y_0 Z_z + Z_0 Z_z \end{aligned}$$

where X_0, Y_0, Z_0 are the values at the initial epoch, and X, Y, Z the values at the final epoch.

$$\begin{aligned} X_z &= \cos \zeta_0 \cos z \cos \theta - \sin \zeta_0 \sin z \\ Y_z &= -\cos \zeta_0 \sin z - \sin \zeta_0 \cos z \cos \theta \\ Z_z &= -\cos z \sin \theta \end{aligned}$$

$$\begin{aligned} X_y &= \sin \zeta_0 \cos z + \cos \zeta_0 \sin z \cos \theta \\ Y_y &= \cos \zeta_0 \cos z - \sin^2 \zeta_0 \\ Z_y &= -\sin z \sin \theta \end{aligned}$$

$$\begin{aligned} X_z &= \cos \zeta_0 \sin \theta \\ Y_z &= -\sin \zeta_0 \sin \theta \\ Z_z &= \cos \theta \end{aligned}$$

For definitions of ζ_0, z and θ see page 756. The numerical values for reduction from the equinox of 1950.0 to the equinoxes of 1900.0, 1925.0, 1975.0 and 2000.0 yield the following series in which T is reckoned in centuries from 1950.0.

$$\begin{aligned} X_z &= 1.00000000 - 0.00029696 T^2 - 0.00000014 T^3 \\ Y_z &= -X_y = -0.02234941 T - 0.00000676 T^2 + 0.00000221 T^3 \\ Z_z &= -X_z = -0.00971691 T + 0.00000206 T^2 + 0.00000098 T^3 \\ Y_y &= 1.00000000 - 0.00024975 T^2 - 0.00000012 T^3 \\ Y_z &= Z_y = -0.00010858 T^2 \\ Z_z &= 1.00000000 - 0.00004721 T^2 + 0.00000002 T^3 \end{aligned}$$

The transformation formula may also be written

$$\begin{pmatrix} X \\ Y \\ Z \end{pmatrix} = \begin{pmatrix} X_0 \\ Y_0 \\ Z_0 \end{pmatrix} \begin{pmatrix} X_z & X_y & X_z \\ Y_z & Y_y & Y_z \\ Z_z & Z_y & Z_z \end{pmatrix}$$

in which the multiplications are to be made column by column. The numerical values for certain special cases are

$$\begin{pmatrix} X_{1900} \\ Y_{1900} \\ Z_{1900} \end{pmatrix} = \begin{pmatrix} X_{1950} \\ Y_{1950} \\ Z_{1950} \end{pmatrix} \begin{pmatrix} +0.99992578 & -0.01117274 & -0.00485885 \\ +0.01117274 & +0.99993758 & -0.00002714 \\ +0.00485885 & -0.00002714 & +0.99998820 \end{pmatrix}$$

$$\begin{aligned} \begin{Bmatrix} X_{1925} \\ Y_{1925} \\ Z_{1925} \end{Bmatrix} &= \begin{Bmatrix} X_{1950} \\ Y_{1950} \\ Z_{1950} \end{Bmatrix} \begin{Bmatrix} +0.9999\ 8144 & -0.0055\ 8690 & -0.0024\ 2934 \\ +0.0055\ 8690 & +0.9999\ 8439 & -0.0000\ 0679 \\ +0.0024\ 2934 & -0.0000\ 0679 & +0.9999\ 9705 \end{Bmatrix} \\ \begin{Bmatrix} X_{1930} \\ Y_{1930} \\ Z_{1930} \end{Bmatrix} &= \begin{Bmatrix} X_{1950} \\ Y_{1950} \\ Z_{1950} \end{Bmatrix} \begin{Bmatrix} +0.9999\ 8812 & -0.0044\ 6959 & -0.0019\ 4346 \\ +0.0044\ 6959 & +0.9999\ 9001 & -0.0000\ 0434 \\ +0.0019\ 4346 & -0.0000\ 0434 & +0.9999\ 9811 \end{Bmatrix} \\ \begin{Bmatrix} X_{1931} \\ Y_{1931} \\ Z_{1931} \end{Bmatrix} &= \begin{Bmatrix} X_{1950} \\ Y_{1950} \\ Z_{1950} \end{Bmatrix} \begin{Bmatrix} +0.9999\ 8928 & -0.0042\ 4613 & -0.0018\ 4628 \\ +0.0042\ 4613 & +0.9999\ 9098 & -0.0000\ 0392 \\ +0.0018\ 4628 & -0.0000\ 0392 & +0.9999\ 9830 \end{Bmatrix} \end{aligned}$$

The values for reduction *from* the equinox of 1950.0 to that of any other year may also be used for reduction *to* the equinox of 1950.0 with the following formula

$$\begin{Bmatrix} X_{1950} \\ Y_{1950} \\ Z_{1950} \end{Bmatrix} = \begin{Bmatrix} X_0 \\ Y_0 \\ Z_0 \end{Bmatrix} \begin{Bmatrix} +X_z & -X_y & -X_x \\ -Y_z & +Y_y & +Y_x \\ -Z_z & +Z_y & +Z_x \end{Bmatrix}$$

in which X_0 , Y_0 and Z_0 are, as above, the known values at the initial epoch.

Sun, referred to Mean Equinox of 1950.0 (Pages 38-45)

The Sun's *Longitude* and *Latitude* are given both in degrees and decimals of a degree and in degrees, minutes and seconds.

The natural value of the *Radius Vector* given here corresponds to the logarithmic value on pages 7-21; it is, of course, independent of the equinox.

First differences of the longitude and of the radius vector are given.

Sun (Page 54)

The *Horizontal Parallax* is the angle subtended at the Sun by the Earth's equatorial radius. The adopted value at unit distance is $8''.80$.

The *Aberration* is the movement in longitude of the Sun during the time taken by light to reach the Earth from the Sun. The apparent longitude is always less than the true geometrical longitude by the amount of the aberration, because the position in which an observer sees the Sun is that which it really occupied about 8^m earlier, when the observed light left the Sun. The adopted constant of aberration is $20''.47$.

The *Elements of the Sun*, as given by Newcomb, are

Epoch 1900 January 0 Greenwich Mean Noon = J.D. 2415020.0

$$\begin{aligned} L &= 279^\circ\ 41'\ 48''.04 + 129602768''.13\ T + 1''.089\ T^2 \\ &= 279^\circ.69668 + 0^\circ.98564\ 73354\ d + 0^\circ.000302\ T^2 \\ \pi &= 281^\circ\ 13'\ 15''.0 + 6189''.03\ T + 1''.63\ T^2 + 0''.012\ T^3 \\ &= 281^\circ.22083 + 0^\circ.00004\ 70684\ d + 0^\circ.000453\ T^2 + 0^\circ.000003\ T^3 \\ g &= L - \pi = 358^\circ\ 28'\ 33''.0 + 129596579''.10\ T - 0''.54\ T^2 - 0''.012\ T^3 \\ &= 358^\circ.47583 + 0^\circ.98560\ 02670\ d - 0^\circ.000150\ T^2 - 0^\circ.000003\ T^3 \\ e &= 0.0167\ 5104 - 0.0000\ 4180\ T - 0.0000\ 00126\ T^2 \end{aligned}$$

where T is measured in Julian centuries of 36525 days, and d in days.

The logarithm of the mean distance a as computed by the expression

$$a^3 n^2 = k^2 (1 + m)$$

where

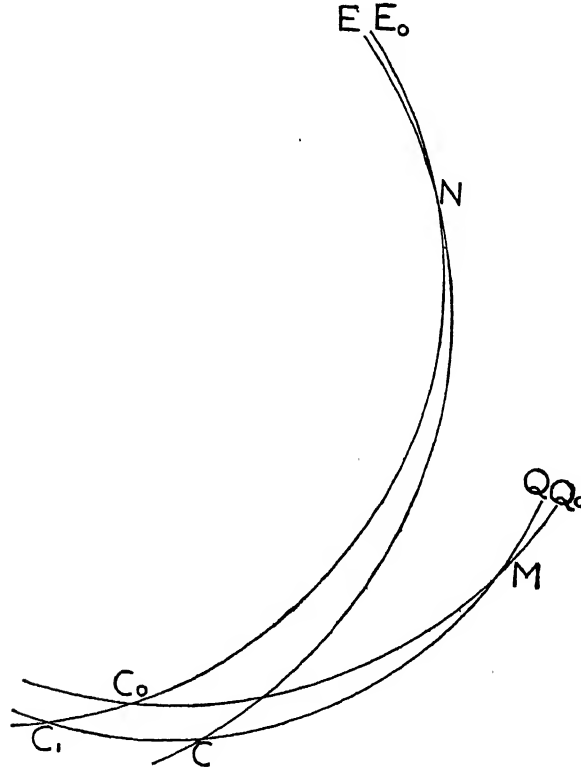
$$\begin{aligned} n &= \text{mean daily motion of the Sun} \\ k &= \text{Gaussian gravitational constant} \\ &= 0.01720209895 = 3548''.18761 \\ m &= \text{mass of Earth + Moon} = 1 \div 329390 \end{aligned}$$

is 0.000000013, to which have been added corrections due to the action of the planets, so that the value adopted in the tables is 0.00000020.

The notation used here is that of Newcomb's *Tables*.

Precessional Constants (Page 54)

The geometrical significance of the various constants may be understood by reference to the diagram in which Q_0 , E_0 and C_0 represent the equator, ecliptic and equinox at some initial epoch t_0 , and Q , E and C at the epoch t . M is the node of the two equators, and N that of the two ecliptics, these nodes being the ascending ones if $t - t_0$ is positive. C_1 is the intersection of the initial ecliptic and the equator of date.



$$\epsilon_0 = E_0 C_0 Q_0 \quad \epsilon = E C Q \quad \epsilon_1 = E_0 C_1 Q$$

If the interval between the two epochs is one year

$$\psi = \text{luni-solar precession} = C_0 C_1$$

$$\lambda = \text{planetary precession on the equator} = C_1 C$$

$$p = \text{general precession in longitude} = C N - C_0 N = \psi - \lambda \cos \epsilon_1$$

$$m = \text{general precession in R.A.} = C M - C_0 M$$

$$n = \text{precession in declination} = C_0 M C$$

$$\pi = \text{inclination of moving ecliptic to fixed ecliptic} = C_0 N C = \text{speed of rotation of ecliptic}$$

If the interval between the two epochs is $t - t_0$ years

$$\pi = \text{ascending node of moving ecliptic on fixed ecliptic} = C_0 N$$

$$\zeta_0 = 90^\circ - C_0 M \quad \zeta = 90^\circ - C_1 M \quad z = C M - 90^\circ$$

$$\theta = \text{inclination of moving to fixed equator} = C_0 M C$$

$$M = \text{general precession in R.A.} = C M - C_0 M = \zeta_0 + z = \bar{m} (t - t_0)$$

$$N = \text{precession in declination} = C_0 M C = \bar{n} (t - t_0) = \theta$$

$$a = \text{general precession in longitude} = C N - C_0 N = \bar{p} (t - t_0)$$

$$b = \text{inclination of moving ecliptic to fixed ecliptic} = C_0 N C = \bar{\pi} (t - t_0)$$

$$c = 180^\circ - \bar{\pi} + \frac{\pi}{2}$$

The following values are given by Newcomb, T being measured in Julian centuries from 1900.0 :—

$$\begin{aligned}\text{Annual luni-solar precession} &= \psi = 50''.3708 + 0''.0050 T \\ \text{Annual planetary precession on equator} &= \lambda = 0''.1248 - 0''.0188 T \\ \text{Annual general precession} &= p = 50''.2564 + 0''.0222 T \\ \text{Annual precession in R.A.} &= m = 3''.07234 + 0''.00186 T \\ \text{Annual precession in Dec.} &= n = 20''.0468 - 0''.0085 T \\ &= 1''.33646 - 0''.00057 T \\ \text{Obliquity} &= \epsilon = 23^\circ 27' 08''.26 - 46''.845 T - 0''.0059 T^2 + 0''.00181 T^3 \\ \Pi &= 173^\circ 57' 06'' + 54''.77 T \\ \pi &= 0''.4711 - 0''.0007 T \\ \zeta_0 &= 2304''.25 T + 0''.30 T^2 + 0''.017 T^3 \\ z &= 2304''.25 T + 1''.09 T^2 + 0''.017 T^3 \\ \theta &= 2004''.68 T - 0''.43 T^2 - 0''.041 T^3\end{aligned}$$

The values on page 54 are for the beginning of the year 1931. They may differ by a unit of the last decimal from values computed from the above formulæ.

The formulæ for the rigorous reduction of star positions from one epoch to another are

α_0, δ_0 = R.A. and Dec. for equinox t_0 and epoch t , i.e. the proper motion for the interval $t - t_0$ is *first* applied

$$\begin{aligned}a &= \alpha_0 + \zeta_0 \\ \cos \delta \sin a' &= \cos \delta_0 \sin a \\ \cos \delta \cos a' &= \cos \theta \cos \delta_0 \cos a - \sin \theta \sin \delta_0 \\ \sin \delta &= \sin \theta \cos \delta_0 \cos a + \cos \theta \sin \delta_0 \\ a &= a' + z\end{aligned}$$

or, if the star is not too near the pole

$$\begin{aligned}a &= \alpha_0 + \zeta_0 \\ p &= \sin \theta (\tan \delta_0 + \tan \frac{1}{2} \theta \cos a) \\ \tan(a' - a) &= \frac{p \sin a}{1 - p \cos a} \\ a &= a + (a' - a) + z = \alpha_0 + (a' - a) + M \\ \tan \frac{1}{2}(\delta - \delta_0) &= \frac{\cos \frac{1}{2}(a' + a)}{\cos \frac{1}{2}(a' - a)} \tan \frac{1}{2} \theta\end{aligned}$$

The formulæ at the foot of page 54 for reducing right ascension and declination may be used if an approximate precession is known to determine $\bar{\alpha}$ and $\bar{\delta}$. Another rigorous form of reduction, intended for use when accurate precessions and secular variations are not available, is given in Tables XIII and XIV, pages 722-724.

The formulæ on page 54, for the reduction of longitude, latitude and orbital elements from 1931.0 to 1950.0 or vice versa, may be regarded as rigorous.

Moon's Mean Equator, Orbit and Mean Longitude (Page 55)

The quantities given are :—

- i = inclination of the Moon's mean equator to the Earth's true equator
- Δ = the distance on the Moon's mean equator from its ascending node on the Earth's true equator to its ascending node on the ecliptic
- ϖ^* = the distance along the Earth's true equator from the true equinox to the ascending node of the Moon's mean equator
- r' = the mean longitude of the Moon's perigee measured along the ecliptic from the mean equinox to the mean ascending node of the Moon's orbit, and then along the Moon's orbit to the mean perigee
- ϖ = the longitude of the mean ascending node of the Moon's orbit on the ecliptic, measured from the mean equinox
- ϱ = the mean longitude of the Moon, measured along the ecliptic from the mean equinox to the mean ascending node of the Moon's orbit, and then along the Moon's orbit.

* The heading of the fourth column on page 55 should be ϖ'

The ascending node of the Moon's equator on the ecliptic is also the descending node of the Moon's orbit on the ecliptic, i.e. $\Omega \pm 180^\circ$.

If

I = the inclination of the Moon's mean equator to the ecliptic ($= 1^\circ 32'.1$)

ϵ = true obliquity

N = nutation in longitude

then

$$\cos i = \cos I \cos \epsilon + \sin I \sin \epsilon \cos(\Omega + N)$$

$$\sin \Omega' = -\sin(\Omega + N) \operatorname{cosec} i \sin I$$

$$\sin \Delta = -\sin(\Omega + N) \operatorname{cosec} i \sin \epsilon$$

$$\text{or } \cos \Delta = -\cos(\Omega + N) \cos \Omega' - \sin(\Omega + N) \sin \Omega' \cos \epsilon$$

Δ being in the opposite quadrant to $\Omega + N$.

The fundamental elements in Brown's *Tables of the Motion of the Moon*, Section I, Chapter I, page 28, are

Epoch 1900 January 0^d.0 G.M.T. = J.D. 2415020.0

$$\zeta = 270^\circ 26' 11''.71 + 481267^\circ 53' 26''.06 T + 7''.14 T^2 + 0''.0068 T^3$$

$$\Gamma' = 334^\circ 19' 46''.40 + 4069^\circ 02' 02''.52 T - 37''.17 T^2 - 0''.045 T^3$$

$$\Omega = 259^\circ 10' 59''.79 - 1934^\circ 08' 31''.23 T + 74''.8 T^2 + 0''.008 T^3$$

$$e = \text{eccentricity} = 0.054900489$$

$$\gamma = \sin \frac{1}{2} i = 0.044886967$$

$$\text{Constant term in sine parallax} = 3422''.5400$$

$$\text{Ratio of mass of Earth to mass of Moon} = 81.53$$

If d is measured in days from the epoch

$$\zeta = 270^\circ 436586 + 13^\circ 1763967302 d + 0''.001983 T^2 + 0''.0000019 T^3$$

$$\Gamma' = 334^\circ 329556 + 0''.1114040803 d - 0''.010325 T^2 - 0''.000012 T^3$$

$$\Omega = 259^\circ 183275 - 0^\circ 0529539222 d + 0''.002078 T^2 + 0''.000002 T^3$$

Moon (Pages 56-71)

The Moon's *Longitude* and *Latitude* are taken from Brown's *Tables of the Motion of the Moon*, and are referred to the true ecliptic and equinox of date, but with the omission of the short-period terms of nutation in longitude. In these quantities no correction is made to Brown's *Tables*, but see also under *Eclipses* and *Occultations*.

The Moon's *Horizontal Parallax*, or the angle subtended at the Moon's centre by the Earth's equatorial radius, is also taken from Brown's *Tables*.

The distance of the Moon is

$$\frac{\text{Earth's equatorial radius}}{\text{sine of Moon's horizontal parallax}}$$

which, using Hayford's value of 3963.34 miles for the Earth's equatorial radius, may be taken as

$$\text{Distance in miles} = \frac{817,535,000}{\text{H.P. in seconds of arc}}$$

The Moon's *Semi-diameter* s is derived from the horizontal parallax by the relation

$$\frac{\sin s}{\sin 15' 32''.58} = \frac{\sin \pi}{\sin 57' 02''.70}$$

where $15' 32''.58$ is the semi-diameter at mean distance as given by Newcomb and $57' 02''.70$ is the mean equatorial horizontal parallax as given by Brown.

This leads to

$$\sin s = 0.272481 \sin \pi$$

or, with an error not exceeding 0''.001

$$s = 0''.079 + 0.272446 \pi$$

No correction is made for irradiation.

The Moon's *Age*, given for every midnight, is the number of days elapsed since the previous New Moon.

The times of the Moon's *Upper and Lower Transits over the Meridian of Greenwich* are given, and are for the centre of the Moon. The variations are per hour of longitude and are always positive; interpolation to any given longitude will yield the local mean time of transit.

Example :—What is the G.M.T. of the Moon's upper meridian passage over the meridian of Cape of Good Hope ($\lambda = -1^h 13^m.9$, from page 680) on February 28?

Upper transit, meridian of Greenwich (page 58)	$20^h 56^m.5$
$2^m.59 \times -1^h.23$	$- 3.2$
Longitude	$- 1^h 13.9$
Sum = G.M.T. of upper transit, meridian of Cape	$19^h 39.4$

Moon's Right Ascension and Declination (Pages 72-163)

The Moon's *Right Ascension and Declination* are referred to the true equator and equinox, but with the omission of short-period terms of nutation. The use of the variations per minute in interpolation is explained and illustrated in the notes on Tables XVI-XIX (pages 798-801).

Phases of the Moon (Page 163)

The phases New Moon, First Quarter, Full Moon and Last Quarter are the Greenwich mean times when the excess of the Moon's longitude (pages 56-71) over the Sun's apparent longitude is 0° , 90° , 180° and 270° respectively. On account of the inclination of the Moon's orbit to the ecliptic the time of New Moon may differ slightly from the time of closest approach of the Sun and Moon.

The times of the Moon's *Perigee and Apogee* are the times when the Moon attains its least and greatest distances respectively from the Earth, i.e. when the horizontal parallax attains its maxima and minima respectively.

Moon at Transit at Greenwich (Pages 164-179)

The column *Illuminated Limbs and Transit* shows the limbs, north or south, and I (preceding or west) or II (following or east) which are fully illuminated at the moment of transit at Greenwich. The indication for north or south limb is given only for upper transit at Greenwich, and is omitted when the transit occurs between 9^h and 15^h G.M.T., i.e. when the Moon is too close to the Sun for observation.

The *Apparent Right Ascension of the Limb* is given for the illuminated limb always, i.e. for limb I between New Moon and Full Moon and for limb II between Full Moon and New Moon.

The *Sidereal Time of Semi-diameter passing the Meridian* is the interval, in sidereal time, between the time of transit of the Moon's centre and the transit of the illuminated limb. Hence

$$\begin{aligned} \text{R.A. of Moon's centre} &= \text{R.A. of limb I} + \text{S.D. in time} \\ &= \text{R.A. of limb II} - \text{S.D. in time.} \end{aligned}$$

The *Apparent Geocentric Declination of the Centre* must be corrected for parallax before being compared with a meridian observation, or, alternatively, a correction $\Delta\delta$ must be applied to the observed declination δ' of the centre to render it comparable with the geocentric declination δ . This correction is given by

$$\begin{aligned} \sin \Delta\delta &= -\rho \sin \pi \sin(\phi' - \delta') \\ \text{or} \quad \Delta\delta &= -0.999957 \rho \pi \sin(\phi' - \delta') \\ \text{or} \quad \tan \Delta\delta &= \frac{-\rho \sin \pi \sin(\phi' - \delta)}{1 - \rho \sin \pi \cos(\phi' - \delta)} \end{aligned}$$

where

$$\begin{aligned} \pi &= \text{horizontal parallax} \\ \rho &= \text{geocentric radius} \\ \phi' &= \text{geocentric latitude} \end{aligned}$$

The *Geocentric Semi-diameter* must be corrected for augmentation before being used to reduce an observed declination of the northern or southern limb to the declination of the centre.

If s = geocentric semi-diameter
 s' = augmented semi-diameter
 δ = geocentric declination of centre

$$\text{then } s' = \frac{s \sin(\phi' - \delta')}{\sin(\phi' - \delta)}$$

in which we may put, with sufficient accuracy,
 $\delta' = \delta - \rho \pi \sin(\phi' - \delta)$

or, rigorously

$$\delta' = \delta + \Delta\delta$$

$\Delta\delta$ being defined in the preceding paragraph.

The *Equatorial Horizontal Parallax* is the geocentric value (as on pages 56-71) interpolated to the time of transit at Greenwich.

At certain times when the east point of the Moon is fully illuminated the west point is nearly so, and vice versa; similarly for the north and south points. If the defect of illumination is not too great it is possible to observe two opposite limbs, the observation of one being really an observation of the terminator and not of the limb, and being corrected by the amount of the *Defective Illumination*, as given in the footnotes. It must be emphasised that the values here given for defective illumination, as well as the indications for illuminated limbs, apply only to transit at Greenwich, and not to other observatories. The formulæ on which they are based are:—

Let α = R.A. of Moon's centre = R.A. of limb $\pm S$
 δ = geocentric declination of Moon's centre
 δ' = apparent declination of Moon's centre = $\delta - \pi \sin(\phi - \delta)$
 $\alpha_{\odot}, \delta_{\odot}$ = Sun's right ascension and declination
 π = Moon's horizontal parallax
 S = sidereal time of semi-diameter passing meridian
 s = geocentric semi-diameter
 ϕ = geographical latitude

the variable quantities being interpolated to the time of transit. Then, if θ is the altitude of the Sun above the horizon for an observer at the north point of the Moon's disc

$$\sin \theta = \sin \delta_{\odot} \cos \delta' - \cos \delta_{\odot} \sin \delta' \cos(\alpha - \alpha_{\odot})$$

If θ is positive the north limb is full and the correction for defective illumination is to be applied to the south limb, and vice versa. If the time of transit is before the time of Full Moon limb I is full and the correction for defective illumination is to be applied to limb II, and vice versa.

$$\text{Defective illumination in R.A.} = \frac{1}{2} S \sin(\alpha - \alpha_{\odot}) \cos^2 \delta_{\odot}$$

$$\text{Defective illumination in Dec.} = s(1 - \cos \theta) = \frac{1}{2} s \sin^2 \theta$$

The defective illumination in R.A. is given only when $\alpha - \alpha_{\odot}$ at transit lies between $11^{\text{h}} 40^{\text{m}}$ and $12^{\text{h}} 20^{\text{m}}$, and the defective illumination in declination when θ is less than 3° .

The use of the variations per hour of longitude for reducing the right ascension of the limb or the declination of the centre to the time of transit over other meridians is illustrated in the explanation of Tables XVI-XIX (pages 798-801). It must be noted, however, that the variation of right ascension is discontinuous when the change from one limb to the other occurs. This takes place twice during the lunar month, at New Moon, when observation is impossible, and at Full Moon. In the latter case the interpolation could be performed by subtracting $2S$ from the right

ascension of limb II for several dates after the change in order to give the right ascension of limb I, and then working with finite differences.

Example.—What is the right ascension of the Moon's limb I at upper transit at Washington on March 4, using the data on page 166?

From page 58 the G.M.T. of upper transit at Greenwich is March 3^d 23^h 53^m.1; this transit will occur at Washington on March 4, whether reckoned in G.M.T. or Washington mean time.

Date	R.A. of limb I			Δ'	Δ''	Δ'''	Δ^{iv}
Mar. 2 U	09 ^h	35 ^m	03 ^s .46				
				^m +30	^s 25.41		
3 L	10	05	28.87	+29	37.49	-47.92	
3 U	10	35	06.36	+28	54.45	-43.04	+2.43
4 L	11	04	00.81	+28	18.72	-35.73	+1.62
5 U	11	32	19.53	+27	51.92	-26.80	
5 L	12	00	11.45			+8.93	

For Washington $\lambda = +05^h 08^m 15^s.75$ (page 692). The use of the Besselian interpolation formula (page 799) gives as the amount to be added to the right ascension at Greenwich to yield the right ascension at Washington

$$+0.428142 \Delta' - 0.0612 (\Delta''_0 + \Delta''_1) + 0.003 \Delta''' + 0.011 (\Delta^{iv}_0 + \Delta^{iv}_1)$$

R.A. at Greenwich	10 ^h	35 ^m	06 ^s .36
+ 0.428142 × + 1734.45	+	12	22.591
- 0.0612 × - 78.77	+		4.821
+ 0.003 × + 7.31	+		0.022
+ 0.011 × + 4.05	+		0.045
Sum = R.A. at Washington	10	47	33.84

Heliocentric Longitudes, Latitudes and Radii Vectors of Planets

The heliocentric places, which are referred to the mean equinox of date, are from the Tables of Newcomb and Hill in the *Astronomical Papers of the American Ephemeris and Nautical Almanac*.

The heliocentric longitude and latitude and the logarithm of the radius vector of Mercury are given each year in the NAUTICAL ALMANAC (pages 180-183 in 1931). Before 1931 these quantities were given for Greenwich mean noon; they are now, in common with the other quantities in the ALMANAC, given for mean midnight.

The corresponding data for Venus are given for 1916-1918 in an appendix to the NAUTICAL ALMANAC for 1915, and for 1919-1940 in an appendix to the issue for 1916.

For Mars the values for 1916-1918 are given in the appendix to the NAUTICAL ALMANAC for 1915, and for 1919-1940 in an appendix to the issue for 1917. Ross's corrections are given in an appendix to the ALMANAC for 1920.

For Jupiter, Saturn, Uranus and Neptune the values for 1916-1940 are given in the appendix to the NAUTICAL ALMANAC for 1915.

Planets at 0^h (Pages 184-227)

The *Apparent Right Ascension and Declination* are referred to the true equator and equinox of date, and are corrected for planetary aberration. The short-period terms of nutation are not included.

The adopted *Semi-diameters* at unit distance, and the authority for each, are

Mercury	3.34	Le Verrier
Venus	8.41	Auwers
Mars	4.68	Hartwig
Jupiter (Equatorial)	98.47	Sampson
Jupiter (Polar)	91.91	Sampson
Saturn (Equatorial)	83.33	Struve
Saturn (Polar)	74.57	Struve
Uranus	34.28	Barnard, See, Wirtz
Neptune	36.56	Barnard

The *Horizontal Parallaxes* are based on a parallax at unit distance of $8''.80$.

In the *Logarithm of the True Distance from the Earth* the word *true* is used to emphasise the fact that the distance given is the actual distance at 0^h , and not at the moment when the light which reaches an observer at 0^h left the planet. The variations per hour, where given, are in units of the seventh decimal.

The time of *Meridian Passage* at Greenwich may be interpolated to give the local mean times of passage over other meridians.

For Uranus and Neptune the ephemerides are given at intervals of four days, with variations per day. Using the notation of page 800 the necessary interpolation formula is

$$f_{\pm d} = f_0 \pm dV + \frac{d^2}{8}V'$$

where d is measured in days.

Planets at Transit at Greenwich (Pages 228-257)

These ephemerides facilitate the reduction of meridian observations of the planets. The right ascensions and declinations are geocentric, are referred to the true equator and equinox of date, are corrected for aberration but not for the short-period terms of nutation, and are for the centre of the planet.

In the case of Jupiter and Saturn the sidereal times of the equatorial semi-diameter passing the meridian, and the polar semi-diameters, have been calculated on the assumption, only approximately true, that the extremities of the axes of rotation are the north and south points of the discs.

Besselian and Independent Day Numbers (Pages 258-285)

The formulæ from which these quantities are computed are given below. The constants of precession, nutation and aberration involved are those adopted by the *Conférence Internationale des Étoiles Fondamentales* which met in Paris in 1896.

L = Sun's mean longitude

\odot = Sun's true longitude, affected by nutation, but not by aberration

Γ = mean longitude of the Sun's perigee

\mathcal{C} = Moon's mean longitude

\mathcal{Q} = mean longitude of the Moon's ascending node

Γ' = mean longitude of the Moon's perigee

ϵ = true obliquity

Long-period terms

$$\begin{aligned} A = \tau &= 0.34215 \sin \mathcal{Q} \\ &- 0.00031 T \sin \mathcal{Q} \\ &+ 0.00415 \sin 2\mathcal{Q} \\ &- 0.02526 \sin 2L \\ &+ 0.00251 \sin (L - \Gamma) \\ &- 0.00099 \sin (3L - \Gamma) \\ &+ 0.00042 \sin (L + \Gamma) \\ &+ 0.00025 \sin (2L - \mathcal{Q}) \end{aligned}$$

Short-period terms

$$\begin{aligned} A' &= -0.00405 \sin 2\mathcal{C} \\ &+ 0.00134 \sin (\mathcal{C} - \Gamma') \\ &- 0.00068 \sin (2\mathcal{C} - \mathcal{Q}) \\ &- 0.00052 \sin (3\mathcal{C} - \Gamma') \\ &+ 0.00030 \sin (\mathcal{C} - 2L + \Gamma') \\ &+ 0.00023 \sin (\mathcal{C} + \Gamma') \\ &+ 0.00012 \sin 2(\mathcal{C} - L) \end{aligned}$$

*Long-period terms—continued.**Short-period terms—continued.*

$$\begin{aligned}
 B = & - 9''.210 \cos \Omega \\
 & + 0.090 \cos 2\Omega \\
 & - 0.551 \cos 2L \\
 & - 0.022 \cos (3L - \Gamma) \\
 & + 0.009 \cos (L + \Gamma) \\
 & + 0.007 \cos (2L - \Omega)
 \end{aligned}$$

$$\begin{aligned}
 B' = & - 0''.088 \cos 2\Omega \\
 & - 0.018 \cos (2\Omega - \Omega) \\
 & - 0.011 \cos (3\Omega - \Gamma') \\
 & + 0.005 \cos (\Omega + \Gamma')
 \end{aligned}$$

$$C = - 20''.47 \cos \epsilon \cos \odot$$

$$D = - 20''.47 \sin \odot$$

$$E = (0''.000165 - 0''.000025 T) \times \text{nutations in longitude, and may be taken as} \\ - 0''.001 \text{ till June 19, and } 0''.000 \text{ throughout the rest of the year.}$$

$$\text{If } \psi = \text{annual luni-solar precession} = 50''.3708 + 0''.0050 T$$

$$\Delta\psi = \text{long-period terms of nutation in longitude}$$

$$d\psi = \text{short-period terms of nutation in longitude}$$

$$\Delta\epsilon = \text{long-period terms of nutation in obliquity}$$

$$d\epsilon = \text{short-period terms of nutation in obliquity}$$

then

$$\begin{aligned}
 A &= \tau + \frac{\Delta\psi}{\psi} \\
 B &= -\Delta\epsilon
 \end{aligned}$$

$$\begin{aligned}
 A' &= \frac{d\psi}{\psi} \\
 B' &= -d\epsilon
 \end{aligned}$$

The independent day numbers are derived from the Besselian day numbers by the following relations

$$\begin{aligned}
 f &= mA + E & h \sin H &= C & f' &= mA' \\
 g \sin G &= B & h \cos H &= D & g' \sin G' &= B' \\
 g \cos G &= nA & i &= C \tan \epsilon & g' \cos G' &= nA'
 \end{aligned}$$

where m and n are given on page 54.

The Besselian and independent day numbers are used to reduce the right ascension α_0 and declination δ_0 of a star from the mean equinox of the beginning of the year to the apparent equinox of date. The Besselian quantities A , B and E or the independent day numbers f , g and G yield the reduction for precession and the long-period terms of nutation, while C and D or h , H and i yield the reduction for aberration. The effect of the short-period terms of nutation is given by A' and B' , or by f' , g' and G' .

In addition to the above corrections the mean position of a star must be corrected for proper motion and for parallax (if known and if sensible) in order to obtain the apparent position. In the case of double stars a correction for orbital motion may also be necessary.

The Besselian day numbers are used with Besselian star constants, defined as follows:—

$$\begin{aligned}
 a &= m'' + n'' \sin \alpha_0 \tan \delta_0 & a' &= n'' \cos \alpha_0 \\
 b &= \frac{1}{15} \cos \alpha_0 \tan \delta_0 & b' &= -\sin \alpha_0 \\
 c &= \frac{1}{15} \cos \alpha_0 \sec \delta_0 & c' &= \tan \epsilon \cos \delta_0 - \sin \alpha_0 \sin \delta_0 \\
 d &= \frac{1}{15} \sin \alpha_0 \sec \delta_0 & d' &= \cos \alpha_0 \sin \delta_0
 \end{aligned}$$

Denoting the proper motion by μ and supposing the parallax to be negligible, the apparent right ascension α and declination δ are found from

$$\alpha = \alpha_0 + Aa + Bb + Cc + Dd + E + \tau\mu\alpha$$

$$\delta = \delta_0 + Aa' + Bb' + Cc' + Dd' + \tau\mu_\delta$$

or

$$\alpha = \alpha_0 + f + \frac{1}{15} g \sin (G + \alpha_0) \tan \delta_0 + \frac{1}{15} h \sin (H + \alpha_0) \sec \delta_0 + \tau\mu\alpha$$

$$\delta = \delta_0 + g \cos (G + \alpha_0) + h \cos (H + \alpha_0) \sin \delta_0 + i \cos \delta_0 + \tau\mu_\delta$$

which do not include the effect of short-period terms. Their effect is

$$\Delta\alpha = A'a + B'b = f' + \frac{1}{15} g' \sin (G' + \alpha_0) \tan \delta_0$$

$$\Delta\delta = A'a' + B'b' = g' \cos (G' + \alpha_0)$$

The short-period terms attain two maxima and two minima during the lunar tropical month. They may amount to $\pm 0^s.020 \pm 0^s.008 \tan \delta$ in right ascension or $\pm 0^s.13$ in declination.

If several apparent positions of one star are required, or if the Besselian star constants are known with sufficient accuracy, the use of the Besselian day numbers is to be preferred; in other cases the independent day numbers will be found more convenient.

In the case of stars near the poles, if strict accuracy be required, higher order terms must also be included.

The correction for parallax may be written

$$\Delta \alpha = -\frac{1}{15} \pi \sin \alpha \sec \delta X + \frac{1}{15} \pi \cos \alpha \sec \delta Y$$

$$\Delta \delta = -\pi \cos \alpha \sin \delta X - \pi \sin \alpha \sin \delta Y + \pi \cos \delta Z$$

where X , Y and Z are the Sun's co-ordinates given on pages 30-37.

As an illustration of the application of the above formulæ the apparent position of α Aquilæ (*Altair*) at upper transit at Greenwich on February 20 will be computed, omitting the short-period terms of nutation, the parallax being $0^s.20$.

From page 301

α_0	19 47 24.975	δ_0	+ 8 41 05.92
Annual var.	+ 2.9264	Annual var.	+ 9.447
μ_α	+ 0.0356	μ_δ	+ 0.392

The Besselian star constants a and a' are the annual precessions in right ascension and declination respectively, i.e.

$$a = \text{annual variation in R.A.} - \mu_\alpha = + 2^s.8908$$

$$a' = \text{annual variation in Dec.} - \mu_\delta = + 9^s.055$$

The Besselian star constants are

	Number	log		Number	log
a	+2.8908	0.4610	a'	+9.055	0.9569
b	+0.0046	7.6628	b'	+0.892	9.9504
c	+0.0305	8.4838	c'	+0.563	9.7509
d	-0.0602	8.77947	d'	+0.068	8.8338

α_0	19 ^h .8
Sidereal time at 0 ^h (page 273)	9 ^h .9

$$\text{Difference} = \text{approximate mean time of transit} = 9^h.9 = 0^d.41$$

Hence all the variable quantities will be interpolated to February 20^d.41.

From the formula given above for the correction for parallax, since $\pi = 0^s.20$

$$\Delta \alpha = + 0^s.012 X + 0^s.006 Y$$

$$\Delta \delta = - 0^s.01 X + 0^s.03 Y + 0^s.20 Z$$

from which, since $X = + 0.86$, $Y = - 0.44$, $Z = - 0.19$

$$\Delta \alpha = + 0^s.010 - 0^s.003 = + 0^s.007$$

$$\Delta \delta = - 0^s.01 - 0^s.01 - 0^s.04 = - 0^s.06$$

Using the natural Besselian day numbers (page 263), and taking τ as 0.137 (page 273)

A	+ 0.0633	B	- 9.02
C	- 16.40	D	+ 9.98
α_0	19 47 24.975	δ_0	+ 8 41 05.92
Aa	+ 0.183	Aa'	+ 0.57
Bb	- 0.041	Bb'	- 8.05
Cc	- 0.500	Cc'	- 9.23
Dd	- 0.601	Dd'	+ 0.68
E	- 0.001		
$\tau \mu_\alpha$	+ 0.005	$\tau \mu_\delta$	+ 0.05
Parallax	+ 0.007	Parallax	- 0.06
Sum = α	19 47 24.027	Sum = δ	+ 8 40 49.88

Using the logarithms of the Besselian day numbers (page 258)

log A	8.8012	log A	8.8012
log a	0.4610	log a'	0.9569
Sum (1)	9.2622	Sum (5)	9.7581
log B	0.9554 n	log B	0.9554 n
log b	7.6628	log b'	9.9504
Sum (2)	8.6182 n	Sum (6)	0.9058 n
log C	1.2147 n	log C	1.2147 n
log c	8.4838	log c'	9.7509
Sum (3)	9.6985 n	Sum (7)	0.9656 n
log D	0.9992	log D	0.9992
log d	8.7794 n	log d'	8.8338
Sum (4)	9.7786 n	Sum (8)	9.8330
α_0	$\begin{matrix} h & m \\ 19 & 47 \end{matrix}$ 24.975	δ_0	$\begin{matrix} s & + & s & ' & '' \\ & 8 & 41 & 05.92 \end{matrix}$
Nat. no. (1)	+ 0.183	Nat. no. (5)	+ 0.57
Nat. no. (2)	- 0.042	Nat. no. (6)	- 8.05
Nat. no. (3)	- 0.499	Nat. no. (7)	- 9.24
Nat. no. (4)	- 0.601	Nat. no. (8)	+ 0.68
E	- 0.001	$\tau\mu\delta$	+ 0.05
$\tau\mu a$	+ 0.005	Parallax	- 0.06
Parallax	+ 0.007	Sum = δ	$\begin{matrix} + & s & ' & '' \\ & 8 & 40 & 49.87 \end{matrix}$
Sum = α	$\begin{matrix} h & m \\ 19 & 47 \end{matrix}$ 24.027		

Using the independent day numbers (page 272) and working by logarithms

α_0	$\begin{matrix} h & m \\ 19 & 47.4 \end{matrix}$	δ_0	$\begin{matrix} + & s & ' & '' \\ & 8 & 41 & 1.1 \end{matrix}$
G	18 32.0	log g	0.9596
H	20 05.4	log cos ($G + \alpha_0$)	9.9141 n
$G + \alpha_0$	14 19.4	Sum (3)	0.8737 n
$H + \alpha_0$	15 52.8	log h	1.2832
log $\frac{1}{r}$	8.8239	log cos ($H + \alpha_0$)	9.7218 n
log g	0.9596	log sin δ_0	9.1790
log sin ($G + \alpha_0$)	9.7570 n	Sum (4)	0.1840 n
log tan δ_0	9.1840	log i	0.8519 n
Sum (1)	8.7245 n	log cos δ_0	9.9950
log $\frac{1}{r}$	8.8239	Sum (5)	0.8469 n
log h	1.2832		
log sin ($H + \alpha_0$)	9.9294 n		
log sec δ_0	0.0050		
Sum (2)	0.0415 n		
α_0	$\begin{matrix} h & m \\ 19 & 47 \end{matrix}$ 24.975	δ_0	$\begin{matrix} s & + & s & ' & '' \\ & 8 & 41 & 05.92 \end{matrix}$
f	+ 0.193	Nat. no. (3)	- 7.48
Nat. no. (1)	- 0.053	Nat. no. (4)	- 1.53
Nat. no. (2)	- 1.100	Nat. no. (5)	- 7.03
$\tau\mu a$	+ 0.005	$\tau\mu\delta$	+ 0.05
Parallax	+ 0.007	Parallax	- 0.06
Sum = α	$\begin{matrix} h & m \\ 19 & 47 \end{matrix}$ 24.027	Sum = δ	$\begin{matrix} + & s & ' & '' \\ & 8 & 40 & 49.87 \end{matrix}$

These results may be compared with those on page 490. It must be remembered, however, that results computed by different processes may differ by one or two units of the last decimal. The working units 0.001 and 0.01 are so much smaller than the probable error of a single observation that these small discrepancies are unimportant.

The natural values of the independent day numbers, tabulated on the same pages as the logarithmic values, may also be used with a slide rule, a calculating machine or Crelle's Tables.

When A , B , C , D , g or i are very small it will be found difficult, and in some cases impossible, to interpolate their logarithms. This difficulty may be overcome by interpolating the natural numbers, and, if necessary, taking the logarithm of the interpolated numbers. It will be noted that, when i is less than about $4''$, $\log i$ is given to three decimals only.

The *Sidereal Time* at 0^h , to the nearest tenth of an hour, is used in determining the interpolating factor for the Besselian or independent day numbers for the time of transit of a star. This factor is

$$\frac{a + \lambda - \text{Greenwich sidereal time at } 0^h}{24}$$

τ is the fraction of the tropical year, reckoned from the commencement of the Besselian fictitious year, or 1931.0.

The quantities j and J are explained in the following paragraph.

Differential Precession, Nutation and Aberration (Pages 271-291)

These quantities are intended to facilitate the reduction of observations in which the differences $\Delta\alpha$ and $\Delta\delta$ of right ascension and declination of a fixed star and of a moving object are determined. If the position of the star be reduced to the equinox of the beginning of the year (or to that of 1950.0), the right ascension of the moving object, referred to the same equinox, is R.A. of star + $\Delta\alpha$ + differential aberration + differential precession and nutation, and similarly for the declination.

The differential aberration is independent of the year, or of the equinox to which the observation is being reduced, so that the table given is permanent. In the case of the differential precession and nutation the values of j and J on pages 271-285 are to be used for reductions to the equinox of the beginning of the year, and those on page 290 for reductions to 1950.0.

The quantities tabulated are defined thus:—

$$F(a) = (C \sin a - D \cos a) \sin 1^m$$

For reduction to 1931.0

$$\begin{aligned} j &= g \sin 1^m \\ J &= G - 6^h \end{aligned}$$

For reduction to 1950.0

$$\begin{aligned} j \sin J_0 &= 20.044 (1950 - 1931 - A) \sin 1^m \\ j \cos J_0 &= B \sin 1^m \\ J &= J_0 - 1^s.5 (1950 - 1931) \end{aligned}$$

The small correction to J_0 arises from the fact that the right ascension actually used is that for 1950.0, whereas it is theoretically more accurate to use the value for the epoch mid-way between the time of observation and 1950.0. Assuming an annual precession of $+3^s.0$ the small correction above enables the star's right ascension for 1950.0 to be used without sensible error. If $\Delta\alpha$ or $\Delta\delta$ is large, α and δ should be replaced by $\alpha + \frac{\Delta\alpha}{2}$ and $\delta + \frac{\Delta\delta}{2}$.

The formulæ of application are given on pages 286, 288 and 290, and all the necessary trigonometrical functions on pages 290 and 291.

Mean Places of Stars (Pages 292-303)

The *Mean Places of Stars* and other data given on these pages are taken from *Positions and Proper Motions of 1504 Standard Stars for the Equinox 1925.0* by W. S. Eichelberger, in the *Astronomical Papers of the American Ephemeris and Nautical Almanac*, Vol. X, Part I.

The *Magnitudes* have been taken from *Harvard Annals* 50, and are, therefore, the same as those given in the Henry Draper Catalogue. In accordance with *Harvard Bulletin* No. 822 the magnitude of γ Argus has been corrected to 1.92.

The *Annual Variations* are the sums of the annual precessions and the annual proper motions.

Stars which lie within 10° of either pole are designated *Circumpolar Stars*, and their mean places are given separately on page 303.

The footnotes give the range of magnitude of variable stars, and, in the case of double stars, the approximate magnitude, distance and position angle of the companion.

Apparent Places of Stars (Pages 304-516)

The apparent places of 25 circumpolar stars (pages 304-353) are given for every day, and include the effect of short-period terms of nutation. The northern stars are given first, followed by the southern stars. When a star passes the meridian twice in any one mean solar day (as happens once each year) the apparent places are given for both transits. The values of $\sec \delta$ and $\tan \delta$ correspond to the mean place.

The apparent places of stars lying between the limits $\pm 80^\circ$ of declination (pages 354-516) are given for every tenth transit at Greenwich, and do not include the effect of short-period terms of nutation. For stars whose declination exceeds $\pm 60^\circ$ only two decimals are given in the right ascension. The mean solar date on which two transits occur is given to the left of the column R.A. The date in the column Mean Solar Date is strictly applicable to the middle star on that page, and is rounded to the nearest tenth of a day, except when the fraction lies between .95 and 1.00, when it is rounded to .9, in order to avoid confusion of date. A system of footnotes removes any possibility of ambiguity as to the transit to which the given figures relate. The first differences of each co-ordinate are given, but without signs, the dashes denoting a change of sign.

The six following stars have been corrected for annual parallax.

ϵ Eridani	0.30	α Centauri	0.76
α Canis Majoris (<i>Sirius</i>)	0.37	α Aquilæ (<i>Altair</i>)	0.20
α Canis Minoris (<i>Procyon</i>)	0.31	δ Cygni	0.30

The seven following stars have been corrected for the effect of orbital motion, the corrections and the orbits on which they are based being given in Appendix II to Eichelberger's Catalogue.

α Canis Majoris (<i>Sirius</i>)	α Centauri
α Geminorum (<i>Castor</i>)	ζ Herculis
α Canis Minoris (<i>Procyon</i>)	δ Cygni
γ Virginis	

The further corrections required for the effect of short-period terms of nutation are

$$\Delta \alpha = A'a + B'b$$

$$\Delta \delta = A'a' + B'b'$$

The Besselian star constants a , b , a' , b' are given to the degree of accuracy necessary.

The line *Authority* shows the office in which the calculation of the apparent place has been made.

Eclipses (Pages 517-523)

In computing the eclipses the following corrections have been applied to the tabular positions of the Sun and Moon as given in the NAUTICAL ALMANAC. They correspond to corrections of $+1''.5$ to the mean longitude of Newcomb's *Tables of the Sun*, and of $+7''.0$ to the mean longitude and $-0''.5$ to the latitude of Brown's *Tables of the Moon*. They are assumed to be constant during the eclipse.

G.M.T.	$\Delta\lambda_{\odot}$	$\Delta\beta_{\odot}$	$\Delta\alpha_{\odot}$	$\Delta\delta_{\odot}$	$\Delta\lambda_{\text{c}}$	$\Delta\beta_{\text{c}}$	$\Delta\alpha_{\text{c}}$	$\Delta\delta_{\text{c}}$
Apr. ^d 2 ^h 20	$+1''.5$	$0''.0$	$+0''.09$	$+0''.6$	$+8''.0$	$-1''.2$	$+0''.46$	$-4''.2$
Apr. 18 02	$+1''.5$	$0''.0$	$+0''.09$	$+0''.5$	$+6''.4$	$+0''.1$	$+0''.41$	$+2''.4$
Sept. 12 03	$+1''.5$	$0''.0$	$+0''.09$	$-0''.6$	$+8''.0$	$-1''.2$	$+0''.46$	$-4''.2$
Sept. 26 20	$+1''.5$	$0''.0$	$+0''.09$	$-0''.6$	$+6''.3$	$+0''.1$	$+0''.38$	$+2''.6$
Oct. 11 14	$+1''.5$	$0''.0$	$+0''.09$	$-0''.6$	$+8''.1$	$-1''.2$	$+0''.47$	$-4''.2$

Eclipses of the Sun. The particulars given under *Elements of the Eclipse* are for the moment of conjunction of the Sun and Moon in right ascension, and not for the time of New Moon, which is the moment of conjunction of the Sun and Moon in longitude.

The Sun's true semi-diameter is based on a value at unit distance of $959''.63$ as given by Auwers in *Astronomische Nachrichten*, 3043, 367. The semi-diameter used for the Sun's ephemeris elsewhere in the NAUTICAL ALMANAC is based on a value of $961''.18$ at unit distance; the difference represents the allowance for irradiation, the effects of which must be removed for eclipse purposes.

The Moon's true semi-diameter is based on a value of k , the ratio of the Moon's equatorial radius to that of the Earth, of 0.272274 ; the value used for the semi-diameter in the Moon's ephemeris is 0.272481 .

The *Besselian Elements of the Eclipse* are given to facilitate the accurate computation of the circumstances of the eclipse for any place on the Earth's surface. Their geometrical significance is as follows.

The fundamental plane passes through the centre of the Earth and is at right angles to the axis of the Moon's shadow, i.e. to the line joining the centres of the Sun and Moon. The position of a point may be defined by a system of rectangular axes with origin at the centre of the Earth. The x axis is the intersection of the equator and the fundamental plane and is directed positively towards the east as seen from the Moon, the y axis is perpendicular to that of x and is directed positively towards the north, the z axis is parallel to the axis of the shadow and is positive towards the Moon. The unit of measurement adopted for these co-ordinates is the Earth's equatorial radius.

The radius of the shadow cone on the fundamental plane is denoted by l , and x and y are the co-ordinates of the centre of the shadow. The direction of the shadow is defined by μ and d , which are the Greenwich hour angle and declination respectively of the point Z on the celestial sphere towards which the axis of the shadow is directed. The values of x , y , l , $\log \sin d$, $\log \cos d$ and μ are tabulated for every 10 minutes during the eclipse. In order to facilitate interpolation the logarithms of x' , y' and μ' , which are the changes of x , y and μ in one minute of time, are given for integral hours of G.M.T. The log tangent of angle of cone refers to the angle f which the boundary of the shadow cone makes with the axis of the shadow.

The formulæ for determining these quantities, which are computed for integral hours and interpolated, are as follows. Let α_{c} , δ_{c} , r and α_{\odot} , δ_{\odot} , R be the right ascension, declination and distance from the centre of the Earth of the centres of the Moon and Sun respectively, and let $b = \frac{\sin \pi_{\odot}}{\sin \pi_{\text{c}}}$ where π_{\odot} and π_{c} are the Sun's and Moon's equatorial horizontal parallaxes. Then a and d , the right ascension and declination of the point Z , are given by

$$a = \alpha_{\odot} - \frac{b}{1-b} \cos \delta_{\text{c}} \sec \delta_{\odot} (\alpha_{\text{c}} - \alpha_{\odot})$$

$$d = \delta_{\odot} - \frac{b}{1-b} (\delta_{\text{c}} - \delta_{\odot})$$

whence μ = Greenwich sidereal time at the moment concerned $-a$

$$x = r \cos \delta_{\alpha} \sin (\alpha_{\alpha} - a)$$

$$y = r [\sin \delta_{\alpha} \cos d - \cos \delta_{\alpha} \sin d \cos (\alpha_{\alpha} - a)]$$

$$z = r [\sin \delta_{\alpha} \sin d + \cos \delta_{\alpha} \cos d \cos (\alpha_{\alpha} - a)]$$

$$\text{where } r = \frac{1}{\sin \pi_{\alpha}}$$

$$\tan f_1 = \frac{0.00466407}{R(1-b)} = \frac{[7.668765]}{R(1-b)} \quad \text{for the penumbral cone}$$

$$\tan f_2 = \frac{0.00464083}{R(1-b)} = \frac{[7.666596]}{R(1-b)} \quad \text{for the umbral cone}$$

$$l_1 = z \tan f_1 + 0.272277 \quad \text{for the penumbral cone}$$

$$l_2 = z \tan f_2 - 0.272277 \quad \text{for the umbral cone.}$$

The variations per minute are derived by the ordinary methods of finite differences.

The times of beginning and ending of the eclipse for a given observer are determined by the fact that at these moments the distance of the observer from the axis of the penumbra will be equal to the radius of the shadow cone at the point of observation. The procedure adopted is to compute the co-ordinates ξ , η and ζ of the observer, together with their variations, for some assumed moment near the time of the phase required. The co-ordinates x and y of the centre of the shadow, and their variations, are determined from the values tabulated. From these two sets of co-ordinates the distance and direction of the observer from the centre of the shadow are obtained, together with their variations. The radius of the penumbra at the distance ζ from the fundamental plane is also calculated, and by the use of the computed values of the variations of the several factors the correction to the assumed time to give the true time of the phase concerned is obtained.

The formulæ are as follows:—

$\rho \sin \phi'$ and $\rho \cos \phi'$ are the geocentric co-ordinates of the place of observation (see pages 718-719) and λ is its longitude.

$$\xi = \rho \cos \phi' \sin (\mu - \lambda)$$

$$\eta = \rho \sin \phi' \cos d - \rho \cos \phi' \sin d \cos (\mu - \lambda)$$

$$\zeta = \rho \sin \phi' \sin d + \rho \cos \phi' \cos d \cos (\mu - \lambda)$$

The variations per minute are

$$\xi' = [7.63983 + 0.00012(10 - \Delta\alpha)] \rho \cos \phi' \cos (\mu - \lambda)$$

$$\eta' = [7.63983 + 0.00012(10 - \Delta\alpha)] \xi \sin d$$

where $\Delta\alpha$ is the Sun's hourly motion, as given in the elements of the eclipse.

The distance m and position angle M of the axis of the shadow relative to the observer may be determined from

$$m \sin M = x - \xi$$

$$m \cos M = y - \eta$$

The magnitude n and direction N of the motion of the centre of the shadow relative to the observer are found from

$$n \sin N = x' - \xi'$$

$$n \cos N = y' - \eta'$$

The radius L at a distance ζ from the fundamental plane is

$$L = l - \zeta \tan f$$

When the eclipse is beginning or ending $m = L_1$, and when the annular or the total phase is beginning or ending $m = L_2$.

The correction τ to the assumed time may be computed from

$$\tau = - \frac{m \cos (M - N)}{n} + \frac{L \cos \psi}{n}$$

$$\text{where } \sin \psi = \frac{m \sin (M - N)}{L}$$

The value of ψ for which $\cos \psi$ is negative should be taken for the beginning of the eclipse, for the beginning of the annular phase or the end of the total phase, and the value for which $\cos \psi$ is positive for the end of the eclipse, for the end of the annular phase or the beginning of the total phase.

If the correction τ exceeds two or three minutes, and great accuracy is desired, a repetition of the computation should be made, using the adjusted times in place of those originally assumed.

The time of greatest eclipse or the middle of the eclipse is the moment when the value of m is a minimum, and is not necessarily the time midway between the beginning and ending. If a time is assumed for this phase the correction is given by

$$\tau = - \frac{m \cos (M - N)}{n}$$

The magnitude of greatest eclipse is the fraction of the Sun's diameter that is obscured by the Moon at mid-eclipse, measured along the line joining the centres of the two discs, and is given by

$$\frac{L_1 - \Delta}{2L_1 - 0.5459}$$

where $\Delta = m \sin (M - N)$ and is always to be taken positively.

The position angle of the point of contact, measured from the north point of the Sun's limb in the direction N.E.S.W., may be obtained by

$$P = N + \psi$$

or, if reckoned from the vertex, by

$$V = P - C$$

where C , the parallactic angle, is given by $\tan C = \frac{\xi}{\eta}$

The *Circumstances of the Eclipse* are, in the case of partial eclipses, the times, for the Earth generally, of beginning, greatest phase and ending, together with the latitudes and longitudes of the places on the Earth at which these phases occur.

It will be clear from general considerations that the localities concerned must of necessity have the Sun in the horizon and this will, with sufficient accuracy for practical purposes, be determined by the condition that the point Z shall be on the horizon. The observer being in the fundamental plane it follows that, approximately, $\xi^2 + \eta^2 = 1$, the co-ordinate ζ being zero. From these conditions the times and localities of the phases can be determined by the foregoing formulæ. An alternative method of determining the approximate times of general beginning and ending is afforded by the fact that at these moments the distance between the centres of the Earth and shadow is $l_1 + 1$, whence

$$x^2 + y^2 = (l_1 + 1)^2$$

As these three variables are tabulated in the Besselian elements, the times when the above equality holds can readily be determined.

The eclipse maps show the localities where the eclipses are visible and enable the times of beginning and ending for any place to be approximately obtained.

Eclipses of the Moon. The *Elements and Circumstances of the Eclipse* are similar to those described for solar eclipses. The times and similar circumstances of a lunar eclipse are, of course, the same for all parts of the Earth from which the Moon is visible.

The times of contact are derived as follows :—

Let α , δ be the right ascension and declination of the Moon M, and α' , δ' the right ascension and declination of that point S towards which the centre of the Earth's shadow is directed ($\alpha' = \text{R.A. of Sun} + 12^h$, $\delta' = -\text{Sun's declination}$).

Let L = angle between the centres of the Moon and the shadow. Then in the spherical triangle formed by joining the points M, S and the north pole P

$$\sin L \sin Q = \cos \delta \sin (\alpha - \alpha')$$

$$\sin L \cos Q = \cos \delta' \sin \delta - \sin \delta' \cos \delta \cos (\alpha - \alpha')$$

where Q is the angle PSM. The problem consists of finding the times at which these equations are satisfied when the appropriate values of L (see below) are substituted in them. The equations can with sufficient accuracy be reduced to

$$L \sin Q = (\alpha - \alpha') \cos \delta$$

$$L \cos Q = \delta - \delta' - \epsilon$$

where $\epsilon = \frac{\sin 2\delta \sin^2 \frac{1}{2}(\alpha - \alpha')}{\sin 1''}$ and can usually be ignored.

Let π , s = parallax and semi-diameter of the Moon

π' , s' = parallax and semi-diameter of the Sun.

The shadow will differ somewhat from a cone as the Earth is not a true sphere, but it will suffice to use a mean radius for the Earth, which is equivalent to substituting for π a parallax π_1 , reduced to latitude 45° , so that $\pi_1 = [9.99928] \pi$. Moreover, observation has shown that the Earth's atmosphere has the effect of increasing the apparent breadth of the shadow by about one-fiftieth. Hence the values of L to be substituted in the above equations will be, for first and last contacts with the penumbra

$$L = \frac{51}{50} (\pi_1 + s' + \pi') + s$$

for first and last contacts with the umbra

$$L = \frac{51}{50} (\pi_1 - s' + \pi') + s$$

and for second and third contacts with the umbra (the beginning and ending of totality)

$$L = \frac{51}{50} (\pi_1 - s' + \pi') - s$$

To solve the equations a method similar to that adopted for solar eclipses is used.

$$\text{Let } x = (\alpha - \alpha') \cos \delta$$

$$x' = \text{hourly variation of } x$$

$$y = \delta - \delta' - \epsilon$$

$$y' = \text{hourly variation of } y$$

x and y are computed for several successive hours at the time of eclipse, x' and y' are found from their differences, and if x_0 and y_0 be the values of x and y at some moment T_0 near opposition, then for any particular time of contact T

$$L \sin Q = x_0 + x' (T - T_0)$$

$$L \cos Q = y_0 + y' (T - T_0)$$

Putting

$$m \sin M = x_0$$

$$n \sin N = x'$$

$$m \cos M = y_0$$

$$n \cos N = y'$$

then

$$\sin \psi = \frac{m \sin (M - N)}{L}$$

and

$$T - T_0 = - \frac{m \cos (M - N)}{n} + \frac{L \cos \psi}{n}$$

$\cos \psi$ being taken with the negative sign for first contact and with the positive sign for last contact. If desired the computations may be repeated, using the times just obtained as commencing times.

The time of greatest obscuration, or the middle of the eclipse, is given by

$$T_0 - \frac{m \cos (M - N)}{n}$$

The magnitude of the eclipse, the Moon's diameter being unity, is obtained from $\frac{L - \Delta}{2s}$ where $\Delta = m \sin (M - N)$ taken positively for the time of mid-eclipse, the value of L being that used for the umbral contacts.

The position angle of contact on the Moon's limb, measured from the north point in the direction N.E.S.W., is $180^\circ + N + \psi$.

The latitudes and longitudes of the places that have the Moon in the zenith at first and last umbral contacts are determined by

$$\begin{aligned}\lambda &= \text{Greenwich sidereal time} - \alpha \\ \phi &= \delta\end{aligned}$$

It is hoped to be able in due course to include in the NAUTICAL ALMANAC a fuller discussion of the computations connected with eclipses and occultations, but meanwhile if further details or more rigorous formulæ are required reference may be made to Chauvenet's *Manual of Spherical and Practical Astronomy* and to Buchanan's *Mathematical Theory of Eclipses*.

Lunar Occultations (Pages 524-567)

The information concerning lunar occultations consists of the mean places of occultation stars (pages 524-527), the elements of occultations (pages 528-560) and predictions of occultations visible at Greenwich, Edinburgh and the Cape of Good Hope (pages 561-567). As occultations are no longer used for the determination of longitude, but for the accurate determination of the Moon's position, elements are not given in cases where it is evident that the occultation could not be observed from any fixed observatory. They are not given within 48 hours of New Moon.

The list given in the *Mean Places of Occultation Stars* includes all stars of magnitude 6.5 or brighter contained in the Washington Zodiacal Catalogue (Hedrick), *Astronomical Papers of the American Ephemeris and Nautical Almanac*, Vol. VIII, Part III, that are occulted during the year, except stars whose mean places are given on pages 292-303.

The *Elements of Occultations* furnish the means whereby the times and circumstances of the occultation of stars or planets by the Moon may be predicted for any locality on the Earth. The selection of the stars is effected by comparing the Moon's hourly ephemeris with the 1931 positions of the stars included in the catalogue, keeping the right ascensions equal, and noting any star whose declination differs from that of the Moon by an amount not exceeding $1^\circ 20'$, this distance being the greatest possible sum of the Moon's parallax and semi-diameter.

In the elements the columns relating to the star include reductions from 1931.0, which are the quantities to be added to the mean places of the stars in order to obtain the apparent places for the time of occultation.

The *Limiting Parallels* are the extreme limits of latitude, north and south, between which the path of the shadow across the Earth will lie. Owing to the varying inclination of the shadow path to the equator it does not follow that an occultation will necessarily be visible even if the observer is situated within these limits.

The *Besselian Elements* of the occultation for the moment of geocentric conjunction of the star and Moon in right ascension are similar to those already described for solar eclipses.

In occultations the fundamental plane passes through the centre of the Earth and is at right angles to the line joining the star and the centre of the Moon. Owing to the distance of the star the Moon's shadow becomes a cylinder whose intersection with the fundamental plane is a circle of invariable size, its diameter being equal to that of the Moon. The value used in occultations for the ratio k of the Moon's radius to that of the Earth's equatorial radius is 0.2725. This value is somewhat larger than that used for eclipses because the eclipse diameter is based on the disappearance of the last Bailey's bead, and therefore represents the diameter between the lowest positions of the lunar valleys, whilst an occultation of a star can take place at any point between the summit of a lunar mountain and the lower portion of a lunar valley.

At the moment of conjunction of the star and Moon in right ascension the co-ordinate x will be zero and the remaining Besselian elements that are tabulated are

T_0 = Greenwich mean time of conjunction

H = Greenwich hour angle of the star at that moment, reckoned positively towards the west and negatively towards the east

Y = value of the co-ordinate y at the moment of conjunction, or the intercept on the y axis of the centre of the shadow

x', y' = variations of x and y in one hour of mean time.

The value of T_0 is obtained by inverse interpolation in the Moon's hourly ephemeris to obtain the moment when the right ascension of the Moon is equal to that of the star. H is derived from

$$H = \text{Greenwich sidereal time of conjunction} - \alpha$$

where α is the common right ascension of the star and Moon.

At the present time the observed mean longitude of the Moon is in excess of the tabular mean longitude by about $7''$, and to correct for this error the values of T_0 and H as derived from the Moon's ephemeris are adjusted by the addition of $-0^m.21$. This correction was not included in the elements of occultations prior to 1931, but may be applied if desired.

The formulæ for x and y , the co-ordinates of the centre of the shadow on the fundamental plane, are

$$x = \frac{\cos \delta_\alpha \sin(\alpha_\alpha - \alpha_*)}{\sin \pi}$$

$$y = \frac{\sin \delta_\alpha \cos \delta_* - \cos \delta_\alpha \sin \delta_* \cos(\alpha_\alpha - \alpha_*)}{\sin \pi}$$

where π is the Moon's horizontal parallax. These may be reduced, with sufficient accuracy, to

$$x = \frac{15 \cos \delta_\alpha (\alpha_\alpha - \alpha_*)}{\pi}$$

$$y = \frac{\delta_\alpha - \delta_*}{\pi}$$

where $\alpha_\alpha - \alpha_*$ is in seconds of time, and $\delta_\alpha - \delta_*$ and π are in seconds of arc.

Y is the value of y at the time of conjunction. The values of x' and y' are derived from

$$x' = \frac{900 \cos \delta_{\alpha} \Delta \alpha_{\alpha}}{\pi}$$

$$y' = \frac{60 \Delta \delta_{\alpha}}{\pi}$$

where $\Delta \alpha_{\alpha}$ and $\Delta \delta_{\alpha}$ are the variations per minute of the Moon's right ascension and declination.

The limiting parallels ϕ_1 and ϕ_2 are derived from*

$$\tan N = \frac{x'}{y'} \quad (N \text{ less than } 90^\circ)$$

$$\cos \gamma_1 = Y \sin N + 0.2725 \quad (\gamma_1 \text{ less than } 180^\circ)$$

$$\cos \gamma_2 = Y \sin N - 0.2725 \quad (\gamma_2 \text{ less than } 180^\circ)$$

$$\sin \beta = \sin N \cos \delta \quad (\beta \text{ less than } 90^\circ)$$

Then, for northern declinations

- | | |
|--|---|
| (1) If $\cos \gamma_2$ is greater than $\sin \beta$ | $\phi_1 = \beta + \gamma_2$ |
| (2) If $\cos \gamma_2$ is less than $\sin \beta$ and | |
| (a) γ_1 is imaginary | $\phi_1 = +90^\circ$ |
| (b) $\cos \gamma_1$ is greater than $\sin \beta$ | $\phi_1 = +90^\circ$ |
| (c) $\cos \gamma_1$ is less than $\sin \beta$ | $\phi_1 = 180^\circ - \beta - \gamma_1$ |
| (3) If $\cos \gamma_2$ is greater than $-\sin N$ | $\sin \phi_2 = \sin (N - \gamma_2) \cos \delta$ |
| (4) If $\cos \gamma_2$ is less than $-\sin N$ | $\phi_2 = -(90^\circ - \delta)$ |
| (5) If γ_2 is imaginary and | |
| (a) $\cos \gamma_1$ is greater than $-\sin N$ | $\phi_2 = -(90^\circ - \delta)$ |
| (b) $\cos \gamma_1$ is less than $-\sin N$ | $\sin \phi_2 = \sin (N - \gamma_1) \cos \delta$ |

For southern declinations

- | | |
|--|---|
| (1) If $\cos \gamma_1$ is less than $-\sin \beta$ | $\phi_2 = \gamma_1 - \beta - 180^\circ$ |
| (2) If $\cos \gamma_1$ is greater than $-\sin \beta$ and | |
| (a) γ_2 is imaginary | $\phi_2 = -90^\circ$ |
| (b) $\cos \gamma_2$ is less than $-\sin \beta$ | $\phi_2 = -90^\circ$ |
| (c) $\cos \gamma_2$ is greater than $-\sin \beta$ | $\phi_2 = \beta - \gamma_2$ |
| (3) If $\cos \gamma_1$ is less than $\sin N$ | $\sin \phi_1 = \sin (N + \gamma_1) \cos \delta$ |
| (4) If $\cos \gamma_1$ is greater than $\sin N$ | $\phi_1 = 90^\circ + \delta$ |
| (5) If γ_1 is imaginary and | |
| (a) $\cos \gamma_2$ is less than $\sin N$ | $\phi_1 = 90^\circ + \delta$ |
| (b) $\cos \gamma_2$ is greater than $\sin N$ | $\sin \phi_1 = \sin (N + \gamma_2) \cos \delta$ |

Predictions of Occultations are given on pages 561-567. The criteria used in selecting the stars for which predictions are given and an example of the use of the coefficients a and b for adjusting the predicted times in order to obtain the times of occultation at neighbouring stations will be found on page 561.

The formulæ used in the predictions are similar to those for solar eclipses. The co-ordinates on the fundamental plane of the centre of the shadow are denoted by x and y and those of the observer by ξ and η . When the distance between the observer and the centre of the shadow is equal to k an occultation will be beginning or ending. This leads to the fundamental equation

$$(x - \xi)^2 + (y - \eta)^2 = k^2$$

which has two real roots (or none) corresponding to immersion and emersion respectively.

The predictions of occultations for Greenwich and Edinburgh form part of a general scheme of prediction for nine stations†, which with the a and b coefficients cover all places in northern and western Europe. Preliminary times are obtained

*These formulæ replace those of Chauvenet, which are very incompletely stated.

†The other stations are Paris (published in the *Connaissance des Temps*), Berlin, Munich and Königsberg (published in the *Berliner Jahrbuch*), Brussels (published in *Annuaire de l'Observatoire Royal de Belgique*), Copenhagen (published in *Nordisk Astronomisk Tidsskrift*) and Breslau (published in *Die Sterne*).

for four of these stations by an adaptation of the principles involved in the graphical method of Father Rigge*, and after these times have been corrected preliminary times for the remaining stations are obtained by means of the a and b coefficients and corrected similarly.

The correction is effected by means of the inequality introduced into the above expression by an error in the assumed time.

$$\begin{aligned} \text{Let} \quad & T = \text{preliminary time} \\ & T_0 = \text{time of conjunction} \\ \text{Then} \quad & t = T - T_0 \\ \text{whence} \quad & x = x't \\ & y = Y + y't \\ & \xi = \rho \cos \phi' \sin h \\ & \eta = \rho \sin \phi' \cos \delta - \rho \cos \phi' \cos h \sin \delta = \eta_1 - Q \sin \delta \end{aligned}$$

where δ is the declination of the star and $h = H - \lambda + t_s$, t_s being the sidereal equivalent of t .

Having thus obtained for the time concerned the values of $x - \xi = f$ and $y - \eta = g$ the value of $f^2 + g^2$ is obtained. If the time used is the true time of occultation the value of $f^2 + g^2$ will be 0.2725^2 or 0.07426 . If $f^2 + g^2$ exceeds or falls short of this constant the true time of occultation will be later or earlier than the assumed time if the phase concerned is a disappearance, the reverse being the case for a reappearance.

The correction to the assumed time is given by

$$\pm \frac{30(f^2 + g^2 - k^2)}{kn \cos \psi}$$

where the upper and lower signs apply to immersion and emersion respectively, and where

$$\begin{aligned} a_0 &= fQ + g\xi \sin \delta \\ kn \cos \psi &= fx' + gy' - 0.2625a_0 \end{aligned}$$

The coefficients a and b are given by

$$\begin{aligned} p &= C^2 \rho \sin \phi' \sin h \\ q &= C^2 \rho \sin \phi' \cos h \\ r &= SC \rho \cos \phi' \cos \delta \\ b_0 &= fp - gq \sin \delta - gr \\ J &= \pm \frac{60^3 \sin 1''}{kn \cos \psi} \\ a &= Ja_0 \\ b &= Jb_0 \end{aligned}$$

the upper and lower signs relating to immersion and emersion respectively, and S and C being tabulated on page 718.

The position angle P , measured from the north point of the Moon's disc in the direction N.E.S.W., is given by

$$\sin P = -\frac{f}{k} \quad \cos P = -\frac{g}{k} \quad \text{or} \quad \tan P = \frac{f}{g}$$

If the preliminary time is more than $0^m.5$ in error the corrected time is used as the starting point of a fresh calculation. The reason for this is that the functions entering into the formulæ for a , b and P are implicitly assumed to relate to the true times of immersion and emersion.

The calculations are made to three significant figures and in practice the whole of the functions used are obtained from simple prepared tables, the multiplications being performed by means of Crelle's tables. A full description of these tables will be given in the NAUTICAL ALMANAC in the near future.

*The Graphic Construction of Eclipses and Occultations, Loyola University Press, Chicago, 1924.

Ephemeris for Physical Observations of the Sun (Pages 568-571)

P = position angle of the axis of rotation, measured eastward from the north point of the disc

B_0 = heliographic latitude of the centre of the disc

L_0 = heliographic longitude of the centre of the disc.

Heliographic longitudes are reckoned from the solar meridian which passed through the ascending node of the Sun's equator on the ecliptic on 1854 January 1, Greenwich mean noon* = (J.D. 239 8220.0).

In the computation of the ephemeris the following elements by Carrington have been used:—

I = inclination of the Sun's equator to the ecliptic = $7^\circ 15'$

Ω = longitude of the ascending node of the Sun's equator on the ecliptic = $73^\circ 40' + 50'' \cdot 25 (t - 1850)$

Sidereal period of rotation (mean solar days) = $25^d \cdot 38$

It will be noticed that no allowance is made for the change in the plane of the ecliptic. The synodic rotation period is $27^d \cdot 2753$.

If λ is the longitude of the Sun

$$\tan x = -\tan \epsilon \cos (\text{Sun's apparent longitude})$$

$$\tan y = -\tan I \cos (\lambda - \Omega)$$

$$P = x + y$$

$$\sin B_0 = \sin I \sin (\lambda - \Omega)$$

$$\tan L = \cos I \tan (\lambda - \Omega)$$

$$L_0 = L \pm 180^\circ - \frac{360^\circ}{25 \cdot 38} \times \text{days elapsed since 1854 Jan. } 1^d \cdot 0$$

x , y and B_0 being taken between the limits $\pm \epsilon$, $\pm I$ and $\pm I$ respectively, and L in the same quadrant as $\lambda - \Omega$.

The equinox of λ is immaterial provided that Ω is referred to the same equinox. It is therefore convenient to refer λ to the equinox of 1950.0, using the values on pages 38-45, and then Ω becomes a constant. For working purposes the formulæ may be written

$$\tan x = -\tan \epsilon \cos (\text{Sun's apparent longitude})$$

$$\tan y = -0.12722 \cos (\lambda - 75^\circ \cdot 063)$$

$$P = x + y$$

$$\sin B_0 = 0.12620 \sin (\lambda - 75^\circ \cdot 063)$$

$$\tan L = 0.99200 \tan (\lambda - 75^\circ \cdot 063)$$

$$\text{or } \cot L = 1.00806 \cot (\lambda - 75^\circ \cdot 063)$$

$$L_0 = L + 112^\circ \cdot 766 + 14^\circ \cdot 18439716 (2430000 \cdot 5 - \text{J.D.})$$

The formula for $\tan L$ or $\cot L$ is used according as $\tan (\lambda - 75^\circ \cdot 063)$ is numerically less than or greater than 1.

The value of L_0 at any given G.M.T. may be found by subtracting from the tabulated value for 0^h the amount given by the following table.

*This is the definition of heliographic longitude that has always been used in the NAUTICAL ALMANAC, although Carrington's zero meridian passed the ascending node twelve hours earlier than the above.

TABLE FOR INTERPOLATION OF L_0

Daily movement of L_0				For all values of the daily movement of L_0					
	$^{\circ}$ 13·16 13·17 13·18	$^{\circ}$ 13·19 13·20 13·21	$^{\circ}$ 13·22 13·23 13·24						
h	$^{\circ}$	$^{\circ}$	$^{\circ}$	m	$^{\circ}$	m	$^{\circ}$	m	$^{\circ}$
00	0·00	0·00	0·00	00	0·00	20	0·18	40	0·37
01	0·55	0·55	0·55	01	·01	21	·19	41	·38
02	1·10	1·10	1·10	02	·02	22	·20	42	·38
03	1·65	1·65	1·65	03	·03	23	·21	43	·39
04	2·20	2·20	2·20	04	·04	24	·22	44	·40
05	2·74	2·75	2·76	05	0·05	25	0·23	45	0·41
06	3·29	3·30	3·31	06	·06	26	·24	46	·42
07	3·84	3·85	3·86	07	·06	27	·25	47	·43
08	4·39	4·40	4·41	08	·07	28	·26	48	·44
09	4·94	4·95	4·96	09	·08	29	·27	49	·45
10	5·49	5·50	5·51	10	0·09	30	0·28	50	0·46
11	6·04	6·05	6·06	11	·10	31	·28	51	·47
12	6·59	6·60	6·61	12	·11	32	·29	52	·48
13	7·13	7·15	7·17	13	·12	33	·30	53	·49
14	7·68	7·70	7·72	14	·13	34	·31	54	·50
15	8·23	8·25	8·27	15	0·14	35	0·32	55	0·50
16	8·78	8·80	8·82	16	·15	36	·33	56	·51
17	9·33	9·35	9·37	17	·16	37	·34	57	·52
18	9·88	9·90	9·92	18	·16	38	·35	58	·53
19	10·43	10·45	10·47	19	·17	39	·36	59	·54
20	10·98	11·00	11·02	20	0·18	40	0·37	60	0·55
21	11·52	11·55	11·58						
22	12·07	12·10	12·13						
23	12·62	12·65	12·68						
24	13·17	13·20	13·23						

It is found convenient for certain classes of observation to number the synodic rotations in continuation of Carrington's (Greenwich Photo-Heliographic) series, of which No. 1 commenced on 1853 November 9. The rotations commencing in 1931 are

Rotation No.	Date of commencement	Rotation No.	Date of commencement
1034	Jan. 1·30 ^d	1041	July 11·21 ^d
1035	Jan. 28·64	1042	Aug. 7·42
1036	Feb. 24·98	1043	Sept. 3·67
1037	Mar. 24·30	1044	Sept. 30·94
1038	Apr. 20·57	1045	Oct. 28·23
1039	May 17·81	1046	Nov. 24·53
1040	June 14·01	1047	Dec. 21·85

Ephemeris for Physical Observations of the Moon (Pages 572-579)

Selenographic longitudes are measured in the plane of the Moon's equator, the axis of reference being the radius of the Moon which passes through the mean centre of the visible disc. The axis therefore rotates with the Moon, and is not fixed in space. The positive direction of measurement is towards the west, i.e. towards *Mare Crisium*.

Selenographic latitudes are measured from the Moon's equator, positively towards the north, i.e. in the hemisphere containing *Mare Serenitatis*.

The *Earth's Selenographic Longitude and Latitude* are the selenographic co-ordinates of the centre of the disc as seen from the centre of the earth. They are also the sums of the optical and physical librations in longitude and latitude respectively.

The optical libration in longitude arises principally from the fact that, while the Moon's rotation on its axis is practically uniform, its angular velocity round the Earth is not uniform, since it moves in an elliptical orbit. The optical libration in latitude is due to the fact that the plane of the Moon's equator does not coincide with the plane of the orbit. At one time the northern pole of the Moon is presented to the Earth, while half a nodical month later the southern pole will be presented to approximately the same extent.

The *Physical Librations* arise because (i) the inclination of the Moon's equator to the Moon's orbit is not strictly constant (ii) the longitude of the ascending node of the Moon's equator on the ecliptic varies slightly on either side of the descending node of the Moon's orbit on the ecliptic and (iii) the rotation of the Moon on its axis is not absolutely uniform. These perturbations are due to the fact that the Moon's moments of inertia about three principal axes, two in the plane of the equator and the third coincident with the axis of rotation, are not the same.

When the libration in longitude, or the Earth's selenographic longitude, is positive the mean centre of the disc is displaced towards the east, thus exposing to view a region on the west limb. When the libration in latitude, or the Earth's selenographic latitude, is positive the mean centre of the disc is displaced towards the south, and a region on the north limb is exposed to view.

The *Sun's Selenographic Colongitude* is 90° (or 450°) minus the Sun's selenographic longitude, and has, together with the Sun's selenographic latitude, been corrected for the effect of physical libration. It is numerically equal to the selenographic longitude of the morning terminator reckoned eastward from the mean centre of the disc. Hence its value is approximately 270° , 0° , 90° and 180° at New Moon, First Quarter, Full Moon and Last Quarter respectively. The longitude of the evening terminator differs by 180° from that of the morning terminator.

The *Position Angle of the Moon's Axis* is the angle which the lunar meridian through the centre of the visible disc makes with the declination circle through the same point. It has been corrected for the effect of physical libration.

The *Position Angle of the Terminator* is the position angle of the northern cusp, or the angle which the line joining the cusps makes with the declination circle through the centre of the Moon.

The *Fraction Illuminated* is equal to the fraction of the area of the Moon's disc illuminated, and also to the illuminated fraction of the diameter at right angles to the line of cusps.

The terminator is a semi-ellipse whose major axis is the line of cusps (i.e. the position angle of the major axis is the position angle of the terminator) and whose semi-minor axis is equal to the semi-diameter multiplied by the difference between 0.50 and the fraction illuminated.

The formulæ used in computing the librations are given below. The value of I and the formulæ for physical libration are those given by Hayn in *Abhandlungen der Königlich Sächsischen Gesellschaft der Wissenschaften*, 29 and 30 (1904 and 1907). The quantities i , Δ , Ω , Γ , Ω , ζ and I have already been defined on page 757. In addition

$$\begin{aligned} g &= \text{Moon's mean anomaly} = \zeta - \Gamma' \\ g' &= \text{Sun's mean anomaly} \\ \lambda, \beta &= \text{longitude and latitude of the Moon} \\ \alpha, \delta &= \text{right ascension and declination of the Moon} \\ l', b' &= \text{optical librations in longitude and latitude} \end{aligned}$$

l'', b'' = physical librations in longitude and latitude
 $l = l' + l''$ = Moon's libration in longitude
 = Earth's selenographic longitude
 $b = b' + b''$ = Moon's libration in latitude
 = Earth's selenographic latitude
 l_{\odot}, b_{\odot} = Sun's selenographic longitude and latitude
 C' = position angle of Moon's axis, without physical libration
 C'' = physical libration of the Moon's axis
 $C = C' + C''$ = position angle of the Moon's axis

Then

$$\sin \mu = \tan^2 \frac{1}{2} I \sin 2(\lambda - \Omega)$$

$$A = \sin I \cos(\lambda - \Omega)$$

$$\tan B = -\tan I \sin(\lambda - \Omega)$$

μ, A and B are tabulated on pages 780-781 with argument $\lambda - \Omega$.

$$l' = \lambda + \mu + Ab' - \zeta$$

$$b' = B - \beta$$

$$\sin C' = \sin i \cos(l' + \Delta + \zeta - \Omega) \sec \delta$$

$$= -\sin i \cos(\alpha - \Omega') \sec b'$$

If

$$M = 0^{\circ}.040 \sin(I' - \Omega) - 0^{\circ}.003 \sin(\zeta - \Omega)$$

$$N = 0^{\circ}.020 \cos(I' - \Omega) + 0^{\circ}.003 \cos(\zeta - \Omega)$$

then

$$l'' = 0^{\circ}.003 \sin g - 0^{\circ}.016 \sin g' - 0^{\circ}.005 \sin 2(\Gamma - \Omega) + C'' \sin b'$$

$$b'' = M \cos l' + N \sin l'$$

$$C'' = (M \sin l' - N \cos l') \sec b'$$

The quantities $\cos l'$ and $\sec b'$ may be put = 1, and the term $C'' \sin b'$ may be taken as $0.018 C'' \times b'$ in degrees.

When the values of λ, β, α and δ used in the above formulæ represent the geocentric co-ordinates of the Moon the resulting values of l, b and C will apply to the centre of the earth. To obtain the values applicable to an observer on the surface of the Earth the apparent co-ordinates of the Moon must be used. It will be found best to correct α and δ for parallax and then obtain the apparent longitude and latitude by conversion of the apparent right ascension and declination in the usual manner. The geocentric physical libration may be used unaltered.

The Sun's selenographical longitude and latitude are computed from similar formulæ in which the heliocentric co-ordinates of the Moon have been substituted for the geocentric co-ordinates.

If

$$\lambda_{\odot} = \text{Sun's true longitude referred to true equinox}$$

$$= \text{mean longitude referred to equinox of 1931.0 + precession + nutation}$$

$$R = \text{radius vector of the Sun}$$

$$\pi = \text{Moon's equatorial horizontal parallax in minutes of arc}$$

$$\lambda_H = \text{Moon's heliocentric longitude}$$

$$\beta_H = \text{Moon's heliocentric latitude}$$

then

$$\lambda_H = \lambda_{\odot} + 180^{\circ} + \frac{8.80 \times 57.296}{60 \pi R} \cos \beta \sin(\lambda_{\odot} - \lambda)$$

$$= \lambda_{\odot} + 180^{\circ} + F_0 F_1 \sin(\lambda_{\odot} - \lambda)$$

$$\beta_H = \frac{8.80 \beta}{60 \pi R} = F_0 \beta$$

$$F_1$$

$$0.00 \quad 57.3$$

$$2.29 \quad 57.2$$

$$4.08 \quad 57.1$$

$$5.31$$

where $F_0 = \frac{8.80}{60 \pi R}$ and can be tabulated in a double entry

table for every minute of π and every tenth day of the year. $F_1 = 57.296 \cos \beta$ and is given in the accompanying critical table.

TABLE FOR OPTICAL LIBRATION OF THE MOON.

The sign is to be taken from the same side as the argument.

$\lambda - \Omega$	μ	A	B	$\lambda - \Omega$	$\lambda - \Omega$	μ	A	B	$\lambda - \Omega$
0	+0°000 +	+0°0268 -	-0°000 +	180	0	+0°010 +	+0°0189 -	-1°085 +	225
1	000	0268	027	181	45	010	0186	104	226
2	001	0268	054	182	46	010	0183	123	227
3	001	0268	080	183	47	010	0179	141	228
4	001	0267	107	184	48	010	0176	159	229
					49	010	0176	159	229
5	+0°002 +	+0°0267 -	-0°134 +	185	50	+0°010 +	+0°0172 -	-1°176 +	230
6	002	0266	160	186	51	010	0169	193	231
7	002	0266	187	187	52	010	0165	210	232
8	003	0265	214	188	53	010	0161	226	233
9	003	0265	240	189	54	010	0157	242	234
10	+0°004 +	+0°0264 -	-0°267 +	190	55	+0°010 +	+0°0154 -	-1°258 +	235
11	004	0263	293	191	56	010	0150	273	236
12	004	0262	319	192	57	009	0146	287	237
13	005	0261	345	193	58	009	0142	302	238
14	005	0260	371	194	59	009	0138	316	239
15	+0°005 +	+0°0259 -	-0°397 +	195	60	+0°009 +	+0°0134 -	-1°329 +	240
16	005	0257	423	196	61	009	0130	343	241
17	006	0256	449	197	62	009	0126	355	242
18	006	0255	474	198	63	008	0122	368	243
19	006	0253	500	199	64	008	0117	380	244
20	+0°007 +	+0°0252 -	-0°525 +	200	65	+0°008 +	+0°0113 -	-1°391 +	245
21	007	0250	550	201	66	008	0109	402	246
22	007	0248	575	202	67	007	0105	413	247
23	007	0247	600	203	68	007	0100	423	248
24	008	0245	624	204	69	007	0096	433	249
25	+0°008 +	+0°0243 -	-0°649 +	205	70	+0°007 +	+0°0092 -	-1°442 +	250
26	008	0241	673	206	71	006	0087	451	251
27	008	0239	697	207	72	006	0083	460	252
28	009	0237	721	208	73	006	0078	468	253
29	009	0234	744	209	74	005	0074	476	254
30	+0°009 +	+0°0232 -	-0°768 +	210	75	+0°005 +	+0°0069 -	-1°483 +	255
31	009	0230	791	211	76	005	0065	489	256
32	009	0227	814	212	77	005	0060	496	257
33	009	0225	836	213	78	004	0056	502	258
34	010	0222	859	214	79	004	0051	507	259
35	+0°010 +	+0°0219 -	-0°881 +	215	80	+0°004 +	+0°0047 -	-1°512 +	260
36	010	0217	902	216	81	003	0042	516	261
37	010	0214	924	217	82	003	0037	520	262
38	010	0211	945	218	83	002	0033	524	263
39	010	0208	966	219	84	002	0028	527	264
40	+0°010 +	+0°0205 -	-0°987 +	220	85	+0°002 +	+0°0023 -	-1°529 +	265
41	010	0202	1007	221	86	001	0019	531	266
42	010	0199	027	222	87	001	0014	533	267
43	010	0196	047	223	88	001	0009	534	268
44	010	0193	066	224	89	000	0005	535	269
45	+0°010 +	+0°0189 -	-1°085 +	225	90	+0°000 +	+0°0000 -	-1°535 +	270

$$l' = \lambda + \mu + Ab' - \zeta$$

$$b' = B - \beta$$

TABLE FOR OPTICAL LIBRATION OF THE MOON.

The sign is to be taken from the same side as the argument.

$\lambda - \Omega$	μ	A	B	$\lambda - \Omega$	$\lambda - \Omega$	μ	A	B	$\lambda - \Omega$
90	0.000	-0.0000	-1.535	270	135	-0.010	-0.0189	-1.085	315
91	0.000	0.0005	.535	271	136	0.010	.0193	.066	316
92	0.001	0.0009	.534	272	137	0.010	.0196	.047	317
93	0.001	0.0014	.533	273	138	0.010	.0199	.027	318
94	0.001	0.0019	.531	274	139	0.010	.0202	1.007	319
95	-0.002	-0.0023	-1.529	275	140	-0.010	-0.0205	-0.987	320
96	0.002	0.0028	.527	276	141	0.010	.0208	.966	321
97	0.002	0.0033	.524	277	142	0.010	.0211	.945	322
98	0.003	0.0037	.520	278	143	0.010	.0214	.924	323
99	0.003	0.0042	.516	279	144	0.010	.0217	.902	324
100	-0.004	-0.0047	-1.512	280	145	-0.010	-0.0219	-0.881	325
101	0.004	0.0051	.507	281	146	0.010	.0222	.859	326
102	0.004	0.0056	.502	282	147	0.009	.0225	.836	327
103	0.005	0.0060	.496	283	148	0.009	.0227	.814	328
104	0.005	0.0065	.489	284	149	0.009	.0230	.791	329
105	-0.005	-0.0069	-1.483	285	150	-0.009	-0.0232	-0.768	330
106	0.005	0.0074	.476	286	151	0.009	.0234	.744	331
107	0.006	0.0078	.468	287	152	0.009	.0237	.721	332
108	0.006	0.0083	.460	288	153	0.008	.0239	.697	333
109	0.006	0.0087	.451	289	154	0.008	.0241	.673	334
110	-0.007	-0.0092	-1.442	290	155	-0.008	-0.0243	-0.649	335
111	0.007	0.0096	.433	291	156	0.008	.0245	.624	336
112	0.007	0.0100	.423	292	157	0.007	.0247	.600	337
113	0.007	0.0105	.413	293	158	0.007	.0248	.575	338
114	0.008	0.0109	.402	294	159	0.007	.0250	.550	339
115	-0.008	-0.0113	-1.391	295	160	-0.007	-0.0252	-0.525	340
116	0.008	0.0117	.380	296	161	0.006	.0253	.500	341
117	0.008	0.0122	.368	297	162	0.006	.0255	.474	342
118	0.009	0.0126	.355	298	163	0.006	.0256	.449	343
119	0.009	0.0130	.343	299	164	0.005	.0257	.423	344
120	-0.009	-0.0134	-1.329	300	165	-0.005	-0.0259	-0.397	345
121	0.009	0.0138	.316	301	166	0.005	.0260	.371	346
122	0.009	0.0142	.302	302	167	0.005	.0261	.345	347
123	0.009	0.0146	.287	303	168	0.004	.0262	.319	348
124	0.010	0.0150	.273	304	169	0.004	.0263	.293	349
125	-0.010	-0.0154	-1.258	305	170	-0.004	-0.0264	-0.267	350
126	0.010	0.0157	.242	306	171	0.003	.0265	.240	351
127	0.010	0.0161	.226	307	172	0.003	.0265	.214	352
128	0.010	0.0165	.210	308	173	0.002	.0266	.187	353
129	0.010	0.0169	.193	309	174	0.002	.0266	.160	354
130	-0.010	-0.0172	-1.176	310	175	-0.002	-0.0267	-0.134	355
131	0.010	0.0176	.159	311	176	0.001	.0267	.107	356
132	0.010	0.0179	.141	312	177	0.001	.0268	.080	357
133	0.010	0.0183	.123	313	178	0.001	.0268	.054	358
134	0.010	0.0186	.104	314	179	0.000	.0268	.027	359
135	-0.010	-0.0189	-1.085	315	180	-0.000	-0.0268	-0.000	360

$$l' = \lambda + \mu + Ab' - \mathcal{C}$$

$$b' = B - \beta$$

A , B and μ are found from the table on pages 780-781 with argument $\lambda_H - \Omega$ and then

$$\begin{aligned} l'_\odot &= \lambda_H + \mu + A b_\odot - \zeta \\ b'_\odot &= B - \beta_H \\ l''_\odot &= 0^\circ.003 \sin g - 0^\circ.016 \sin g' - 0^\circ.005 \sin 2(\Gamma' - \Omega) \\ &\quad + (M \sin l'_\odot - N \cos l'_\odot) \tan b'_\odot \\ b''_\odot &= M \cos l'_\odot + N \sin l'_\odot \end{aligned}$$

For the position angle T of the terminator and F , the fraction illuminated, two sets of formulæ are employed, as T cannot be checked near New Moon and Full Moon by the usual process of differencing.

$$\tan N = \frac{\tan \delta_\odot}{\cos (a_\odot - a)}$$

N being taken between the limits $\pm 90^\circ$.

$$\tan T = \cot (a_\odot - a) \sin (\delta - N) \sec N$$

T being taken in the first or fourth quadrant.

$$f = \cos (a_\odot - a) \cos \delta_\odot \cos (\delta - N) \sec N$$

$$F = \frac{1-f}{2}$$

The alternative formula for T is

$$\tan M = \frac{\tan b_\odot}{\sin (c_\odot + l)}$$

where c_\odot is the Sun's selenographic colongitude and M is taken between the limits $\pm 90^\circ$.

$$\tan (T - C) = \tan (c_\odot + l) \sin (M - b) \sec M$$

$T - C$ being taken between the limits $\pm 90^\circ$.

$$T = C + (T - C)$$

Occasionally near New Moon or Full Moon this formula will yield the position angle of the southern cusp, i.e. an angle between 90° and 270° , in which case 180° must be added or subtracted.

It would be possible to compute f from

$$f = -\sin (c_\odot + l) \cos b_\odot \cos (M - b) \sec M$$

but in practice it is better to use

$$F = \text{haversine } (\lambda_\odot - \lambda) = \text{haversine } (\lambda - \lambda_\odot)$$

which neglects the Moon's latitude, and is thus not strictly accurate, but serves as a check. The maximum error, at New or Full Moon, is 0.002, the value tending to be too small before First Quarter and too large after.

It should be noted that the values published are geocentric, and may differ somewhat from those observed from the Earth's surface.

The Sun's altitude A at a point on the Moon in selenographic longitude λ_0 and latitude β_0 may be found from

$$\sin A = \sin b_\odot \sin \beta_0 + \cos b_\odot \cos \beta_0 \sin (c_\odot + \lambda_0)$$

The position of the point may be defined by means of its direction cosines ξ , η , ζ , the axis of ξ being that diameter of the Moon's equator which is 90° from the mean centre of the disc, and the positive direction being towards the west (i.e. as seen in the sky, not by an observer on the Moon), the axis of η being the Moon's polar axis, positive towards the north, and the axis of ζ the diameter through the mean centre of the disc. Then

$$\sin A = \xi \cos c_\odot \cos b_\odot + \eta \sin b_\odot + \zeta \sin c_\odot \cos b_\odot$$

Neither formula is convenient when the Sun's altitude is very great, for an angle near 90° cannot easily be determined accurately from its sine. However, when the Sun is high the shadows are so inconspicuous that it is not necessary to compute its altitude with great accuracy.

An ephemeris of the crater Mösting A is given each year in the *Berliner Jahrbuch*.

Illuminated Disc of Mercury and Venus (Pages 580-581)

The notation is explained on pages 580-581. θ is the position angle of the arc of the great circle from the planet to the Sun increased by 90° . If on the disc of the planet an arrow be drawn towards position angle θ , the illuminated portion of the disc will be on the right of the arrow. When θ is less than 180° the north limb of the planet is full; when greater the south limb. When θ is between 90° and 270° limb II, i.e. the following or east limb, is full. The position angle of the direction of greatest defect of illumination is $\theta + 90^\circ$.

The terminator is a semi-ellipse whose major axis is a diameter of the planet in position angle θ and whose semi-minor axis is of length S.D. \times (difference between k and 0.500) in position angle $\theta - 90^\circ$ when k is less than 0.5, and $\theta + 90^\circ$ when k is greater than 0.5.

When i is greater than 90° , k is less than 0.5, i.e. the planet is horned, and the correction of an observation of the cusp for defective illumination in declination is S.D. $\times (1 \pm \cos \theta)$, the sign being so taken as to make the quantity within the bracket less than unity.

When i is less than 90° , k is greater than 0.5, i.e. the planet is gibbous. If angles ϕ and ψ (in the first quadrant) are found from

$$\sin \phi = \sin i \cos \theta \quad \sin \psi = \sin i \sin \theta$$

the correction for defective illumination in right ascension is Sidereal time of S.D. passing meridian $\times (1 - \cos \phi)$ and that in declination is S.D. $\times (1 - \cos \psi)$.

When the corrections are very small they are sensibly equal to

$$\text{Sidereal time of S.D. passing meridian} \times \frac{1}{2} \sin^2 i \cos^2 \theta \text{ and S.D.} \times \frac{1}{2} \sin^2 i \sin^2 \theta$$

The formulæ used in computing the quantities given are, using α and δ for the co-ordinates of the planet:—

$$\tan M = \cot \delta_\odot \cos (\alpha - \alpha_\odot)$$

M being taken in the first or second quadrant.

$$\tan \theta = \cos (M + \delta) \cot (\alpha - \alpha_\odot) \operatorname{cosec} M$$

where $\cos \theta$ has the same sign as $\sin (\alpha - \alpha_\odot)$.

$$\sin i = \frac{R \cos \delta_\odot \sin (\alpha - \alpha_\odot) \sec \theta}{r}$$

R and r being the radii vectores of the Earth and planet respectively.

If i is near 90° it is not easily determined from its sine. In that case

$$\sin D = \cos \delta_\odot \sin (\alpha - \alpha_\odot) \sec \theta$$

D being taken in the second quadrant.

$$\sin S = \frac{\Delta \sin D}{r}$$

Δ being the distance of the planet from the Earth and S being in the first quadrant in all cases where it is necessary to use it. Then

$$i = D - S$$

$$k = \frac{1}{2}(1 + \cos i) = 1 - \text{haversine } i$$

The *Brilliance of the Disc* is really the brightness as compared with that of a fictitious planet of semi-diameter $1''$, situated at unit distance from the Sun and at the same distance from the Earth as the planet, and supposed to be fully illuminated and to have the same albedo as the planet. Hence

$$L = \frac{s^2 k}{r^2}$$

where s = semi-diameter. With the adopted values $3''.34$ and $8''.41$ of the semi-diameters at unit distance

$$\begin{aligned} L &= \frac{[1.0475] k}{r^2 \Delta^2} && \text{for Mercury} \\ &= \frac{[1.8496] k}{r^2 \Delta^2} && \text{for Venus} \end{aligned}$$

The *Stellar Magnitudes* are computed from Müller's formulæ :—

$$\begin{aligned} \text{For Mercury} &+ 1.16 + 5 \log r \Delta + 0.02838 (i - 50^\circ) + 0.0001023 (i - 50^\circ)^2 \\ \text{For Venus} &- 4.00 + 5 \log r \Delta + 0.01322 i + 0.0000004247 i^3 \end{aligned}$$

Ephemeris for Physical Observations of Mars (Pages 582-585)

The *Light Time* is the time required for light to travel from the planet to the Earth, the time required to travel unit distance being taken as 498^s.58.

The *Stellar Magnitude* is based on Müller's formula

$$- 1.30 + 5 \log r \Delta + 0.01486 i$$

P = position angle of the axis of rotation, measured eastward from the northern point of the disc

A_\oplus, A_\odot = areocentric right ascension of the Earth and Sun respectively, measured in the plane of the planet's equator from its vernal equinox

D_\oplus, D_\odot = areocentric declinations of the Earth and Sun respectively, referred to the planet's equator

\odot_s = areocentric longitude of the Sun, measured in the plane of the planet's orbit from its vernal equinox

k = ratio of the area of the illuminated portion of the apparent disc to the area of the entire apparent disc regarded as circular

i = angle between the Sun and Earth as seen from Mars

q = angular value of the greatest defect of illumination as seen from the Earth

Q = position angle of the point of greatest defect of illumination, measured from the north point of the disc. The position angle of the line of cusps is $Q \pm 90^\circ$

The *Diameter* is based on a diameter at unit distance of 9".36.

The column *Central Meridian* gives the longitude of the meridian which bisects the centre of the disc, measured from the adopted zero meridian. No correction is made for phase.

The column *G.M.T. of Transit of Zero Meridian* gives the G.M.T. of every transit of the zero meridian across the actual centre of the disc.

All the above quantities have been corrected for aberration, so that in using them they should be interpolated to the actual time of observation.

The assumed position of the north pole of Mars is

$$\alpha_0 = 21^h 10^m 00^s + 1^s.565 (t - 1905.0)$$

$$\delta_0 = 54^\circ 30' 00'' + 12''.60 (t - 1905.0)$$

as given by Lowell and Crommelin (*M.N.R.A.S.* 66, 56). The zero meridian may be defined by adopting as the longitude of the central meridian on 1897 May 15.0 G.M.T. the value $52^\circ.01$, as given by Marth (*M.N.R.A.S.*, 56, 403). However, on account of changed values for the position of the axis of Mars, the ephemeris is actually calculated on the assumption that the longitude of the central meridian on 1909 January 15.0 was $344^\circ.41$, as given in the NAUTICAL ALMANAC, and based on the present value of the position of the axis. The daily motion in longitude of the zero meridian is taken as $350^\circ.89202$, which corresponds to a period of rotation of $24^h 37^m 22^s.654$. The daily motion and period of rotation are regarded as being relative to the planet's true equinox; in other words the period is the Martian sidereal day, and differs slightly from the true period of axial rotation on account of a slight precession of the Martian equinoxes.

The formulæ on which the ephemeris is based are given below. In addition to the quantities already defined

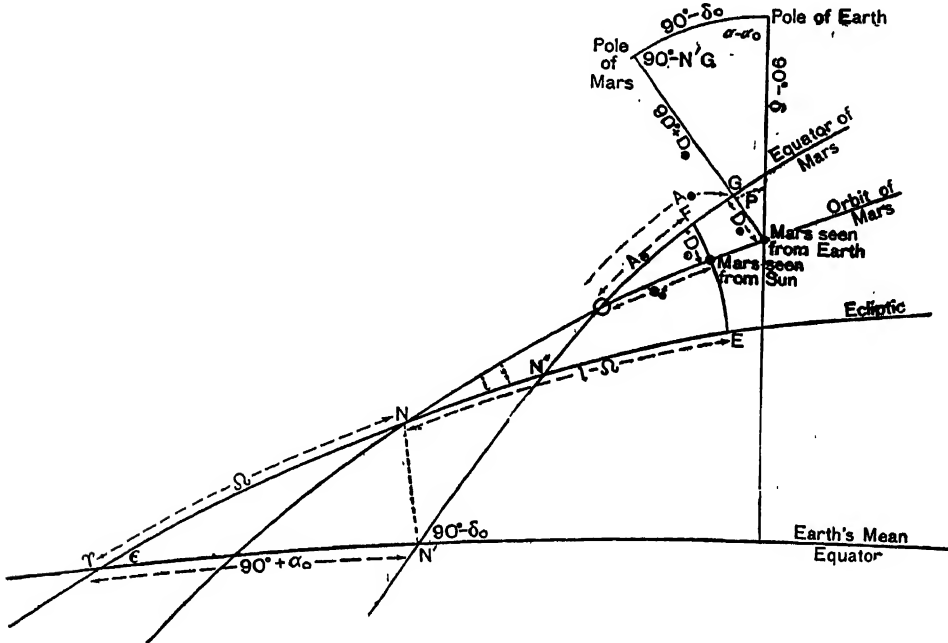
a, δ, Δ = geocentric equatorial co-ordinates of Mars

l, b, r = heliocentric ecliptic co-ordinates of Mars

Ω, i = node and inclination to the ecliptic of the orbit of Mars

ϵ = mean obliquity.

In the diagram, which shows the projections on the celestial sphere of the four planes involved, O is the ascending node of the equator of Mars on the orbit of Mars, i.e. the planet's autumnal equinox. The geocentric or heliocentric longitude of Mars measured in the plane of its equator from this autumnal equinox will be the same as the areocentric right ascension of the Earth or Sun respectively, measured in the same plane from the vernal equinox. The geocentric or heliocentric declinations of Mars measured from the plane of the planet's equator will be the same numerically as the areocentric declinations of the Earth and Sun respectively, but will be reversed in sign.



The ascending node of the equator of Mars on the Earth's mean equator will be in R.A. $90^\circ + \alpha_0$, and the inclination of the two equators will be $90^\circ - \delta_0$.

The adopted values of Ω and i are taken from Newcomb's orbit of Mars, with Ross's corrections

$$\Omega = 48^\circ 47' 11''.27 + 2775''.57 T - 0''.005 T^2$$

$$i = 1^\circ 51' 01''.20 - 2''.430 T + 0''.0454 T^2$$

It is necessary to know three quantities which change slowly with the time—the arcs NO and N'O and the angle NON'. In the triangle N φ N', $\varphi N = \Omega$, $N \varphi N' = \epsilon$ and $\varphi N' = 90^\circ + \alpha_0$, all of which are known; so that the triangle can be completely solved. Then $ONN' = 180^\circ - \varphi NN' + i$, $NN'O = 90^\circ - NN'\varphi + \delta_0$, and NN' is now known, so that the three quantities may be found.

It has been assumed that the Earth's mean equator has been used, whereas actually the point N' should be the intersection of the Earth's true equator and the equator of Mars. The only quantity affected by nutation is N'O, which is equal to $N'N'' + N''O$, the part N''O not being affected. Differentiating the triangle N' φ N'

$$\Delta N'N'' = \cos(90^\circ + \alpha_0) \sin \epsilon \sec \delta_0 \Delta \psi + \sin(90^\circ + \alpha_0) \sec \delta_0 \Delta \epsilon$$

where

$$\Delta \psi = \text{nutation in longitude}$$

$$\Delta \epsilon = \text{nutation in obliquity} = -B$$

The effect of nutation on $N'N''$ may amount to $\pm 0^{\circ}004$, and the annual change of this effect cannot exceed $0^{\circ}001$. If we put

$$X = 90^{\circ} - N'O$$

then

$X = 90^{\circ} - N'O$ for mean equator $-0^{\circ}00013 \Delta\psi + 0^{\circ}00036 B$ and may be tabulated for the beginning of each year.

In the triangle formed by Mars and the poles of the Earth and Mars the sides and angles will be as shown on the diagram. Now

$$\begin{aligned} A_{\oplus} + 180^{\circ} &= N'G - N'O + 180^{\circ} \\ &= 180^{\circ} - (90^{\circ} - N'G) + (90^{\circ} - N'O) \\ &= R + X \end{aligned}$$

where $R = 180^{\circ} - (90^{\circ} - N'G)$. Hence to solve the triangle

$$\tan H = \cot \delta_0 \cos(\alpha_0 - \alpha) \quad (1)$$

$$\tan K = \cot \delta \cos(\alpha_0 - \alpha) \quad (2)$$

H and K being between the limits $\pm 90^{\circ}$.

$$\tan P = \tan(\alpha_0 - \alpha) \sin H \sec(H + \delta) \quad (3)$$

P being in the first or fourth quadrant.

$$\tan R = \tan(\alpha_0 - \alpha) \sin K \sec(K + \delta_0) \quad (4)$$

$\cos R$ having the opposite sign to $\sec(K + \delta_0)$

$$\tan D_{\oplus} = -\tan(H + \delta) \cos P \quad (5)$$

$$= \tan(K + \delta_0) \cos R \quad (6)$$

In these equations α and δ are the apparent right ascension and declination of the planet, so that no further correction for aberration is necessary. But α_0 and δ_0 also should strictly be referred to the true equator and equinox. They may first be reduced to the equinox of the beginning of the year by applying the precessions given, which include the effect of a small precession of the Martian vernal equinox. The further reductions to the equinox of date would then be

$$\begin{aligned} \Delta\alpha_0 &= Aa + Bb + (1^s.565 - a)\tau \\ \Delta\delta_0 &= Aa' + Bb' + (12''.60 - a')\tau \end{aligned}$$

These amount to

$$\begin{aligned} \Delta\alpha_0 &= 1.81 A + 0.070 B - 0.24 \tau && \text{in seconds of time (7)} \\ \Delta\delta_0 &= 0.0041 A + 0.0002 B - 0.0006 \tau && \text{in degrees.} \end{aligned}$$

Denoting by M' the position of Mars as seen from the Sun, and by $M'E$ the perpendicular from Mars to the ecliptic

$$\begin{aligned} \odot_s &= OM' = NM' - NO \\ NE &= \gamma E - \gamma N = l - \varnothing \\ \tan NM' &= \tan(l - \varnothing) \sec i \end{aligned}$$

or, since i is very small

$$NM' = l - \varnothing + 0^{\circ}015 \sin 2(l - \varnothing)$$

A correction for aberration must be applied to NM' . This will be strictly equal to the daily motion of Mars in heliocentric longitude \times the time in days required by light to travel from the Sun to Mars, and then back to the Earth. If the eccentricity e is small

$$dv = dM (1 + 2e \cos M) \quad r = a (1 - e \cos M)$$

so that

$$r dv = a dM (1 + e \cos M)$$

Hence the portion of the aberration relating to the distance from Mars to the Sun fluctuates only 9 per cent on either side of its mean, which is $0^{\circ}005$. The average distance of Mars from the Earth during the period covered by the physical ephemeris may be taken as 0.7 units, giving a further correction of 0.002. If we put

$$Y = NO + 0^{\circ}007$$

then

$$\odot_s = l - \varnothing + 0^{\circ}015 \sin 2(l - \varnothing) - Y \quad (8)$$

If $M'F$ is the perpendicular to the equator of Mars

$$OF = A_{\odot} \quad M'F = D_{\odot}$$

so that

$$\tan A_{\odot} = \tan \odot_{\delta} \cos Z \quad (9)$$

$$\sin D_{\odot} = \sin \odot_{\delta} \sin Z \quad (10)$$

where Z is the angle $NON' = FOM' =$ the obliquity of the Martian ecliptic.

The values of the slowly changing quantities for the years 1930 to 1940 are shown in the table below.

Year	α_0	δ_0	\odot	X	Y	Log sin Z	Log cos Z
1930.0	^h 21 ^m 10 ^s 39.1	[°] 54.588	[°] 49.018	[°] 44.085	[°] 38.951	9.60895	9.96080
1931.0	40.7	.591	.025	.079	.955	.60896	.96080
1932.0	42.3	.594	.033	.073	.958	.60896	.96080
1933.0	43.8	.598	.041	.067	.962	.60897	.96080
1934.0	45.4	.602	.049	.062	.966	.60897	.96080
1935.0	^h 21 ^m 10 ^s 47.0	[°] 54.605	[°] 49.056	[°] 44.057	[°] 38.970	9.60898	9.96080
1936.0	48.5	.608	.064	.052	.974	.60898	.96080
1937.0	50.1	.612	.072	.048	.978	.60899	.96079
1938.0	51.6	.616	.079	.044	.982	.60899	.96079
1939.0	53.2	.619	.087	.040	.986	.60900	.96079
1940.0	^h 21 ^m 10 ^s 54.8	[°] 54.622	[°] 49.095	[°] 44.036	[°] 38.990	9.60900	9.96079

For the quantities on the right-hand pages

$$\tan M = \cot \delta_{\odot} \cos (\alpha - \alpha_{\odot}) \quad (11)$$

M being taken in the first or second quadrant.

$$\tan Q = -\tan (\alpha - \alpha_{\odot}) \sin M \sec (M + \delta) \quad (12)$$

where $\sin Q$ has the same sign as $\sin (\alpha - \alpha_{\odot})$

$$\sin i = \frac{R \cos \delta_{\odot} \sin (\alpha - \alpha_{\odot}) \operatorname{cosec} Q}{r} \quad (13)$$

$$k = \frac{1 + \cos i}{2} \quad (14)$$

$$\text{Diameter} = \frac{9''.36}{\Delta} = \frac{[9.97128]}{\Delta} \quad (15)$$

$$q = \text{diameter} \times (1 - k) \quad (16)$$

If

V = Martian hour angle of the vernal equinox for a point on the zero meridian
= sidereal time for the "Greenwich" of Mars

then

$V - A_{\oplus}$ = Martian hour angle of the Earth for a point on the zero meridian
= longitude of the central meridian as seen from the Earth.

To allow for aberration V must be diminished by the amount of the angular rotation in the planet's light time, i.e. by $[0.30640] \Delta$, so that

$$\text{Longitude of C.M.} = V + 180^{\circ} - (A_{\oplus} + 180^{\circ}) - \text{angular rotation in light time.} \quad (17)$$

To obtain the value of $V + 180^{\circ}$

Longitude of C.M. 1909 January 15 ^d .0	344.41
$A_{\oplus} + 180^{\circ}$ (from N.A. for 1909)	337.38
Rotation in light time	4.055
Sum = $V + 180^{\circ}$ on 1909 January 15 ^d .0	325.845

Hence

$$V + 180^\circ = 325^\circ.845 + 350^\circ.89202 \text{ (J.D. - 2418322.0)} \quad (18)$$

The G.M.T. of transit of the zero meridian is found by determining from the longitudes of the central meridian at 0^h the time when the longitude of the central meridian is 0°.

Satellites of Mars (Pages 586-587)

The data given are derived from the elements given by H. Struve in *Sitzungsberichte der Königlich Preussischen Akademie der Wissenschaften*, 1911, page 1073, and to be found also in the introduction to the *Connaissance des Temps* each year.

The quantities on page 587, in conjunction with the times of greatest eastern elongation on page 586, enable an approximate position angle p and distance s of the satellite from the centre of the primary to be determined. The apparent orbit of the satellite is an ellipse whose semi-major axis is of length $\frac{a(\rho)}{\rho}$ and in position angle P . P_0 is the value of P at some arbitrary date near opposition, and is the quantity appearing in the column p^1 for the time 0^h 00^m from eastern elongation. The angle through which the satellite has moved since eastern elongation, increased by P_0 , is the quantity p^1 . F is the ratio of the actual distance of the satellite from the primary to the distance at elongation. a is the semi-major axis in seconds of arc at the mean distance (ρ) of Mars, so that $a(\rho)$ is the semi-major axis at unit distance. ρ is the distance of Mars from the Earth (denoted elsewhere by Δ).

As the eccentricity of the apparent orbit of the satellite is continually varying it is evident that the quantities p^1 and F are also changing. The values given are accurate in the neighbourhood of opposition. The positions of the satellites deduced from the data given are intended to serve for identification purposes only, and not for the comparison of observations with theory.

Ephemeris for Physical Observations of Jupiter (Pages 588-591)

The definitions of the quantities tabulated are similar to those already given for Mars. The zenocentric longitude of the Sun is not tabulated. It may be noted that Q is also the position angle of the shadows of the satellites measured from the satellites themselves.

The assumed position of the north pole of Jupiter is

$$\begin{aligned} \alpha_0 &= 17^{\text{h}} 52^{\text{m}} 00^{\text{s}}.84 + 0^{\text{s}}.247 (t - 1910.0) \\ \delta_0 &= 64^\circ 33' 34''.6 - 0''.60 (t - 1910.0) \end{aligned}$$

which has been deduced from the position given by Damoiseau for 1750 in *Tables Écliptiques des Satellites de Jupiter*.

The position of the zero meridian is defined by the following adopted values of the longitude of the central meridian on 1897 July 14.0 G.M.T.

$$\text{System I} \quad 47^\circ.31 \qquad \text{System II} \quad 96^\circ.58$$

these being the last values published by Marth (*M.N.R.A.S.* 56, 523) before his death. The adopted daily motions of the zero meridians (relative to the vernal equinox of Jupiter) and the resulting periods are:—

$$\begin{array}{ll} \text{System I} & 877^\circ.90 \qquad 9^{\text{h}} 50^{\text{m}} 30^{\text{s}}.003 \\ \text{System II} & 870^\circ.27 \qquad 9^{\text{h}} 55^{\text{m}} 40^{\text{s}}.632 \end{array}$$

The equatorial diameter at unit distance is taken as $196''.94$, and the polar diameter as $\frac{1}{4}$ of this, or $183''.81$. The excess of the equatorial diameter over the polar is calculated as follows:—

$$\begin{array}{ll} D_\oplus & \cdot F \\ 0.00 & 0.0667 \\ 0.89 & 0.0666 \\ 2.35 & 0.0665 \\ 3.21 & 0.0664 \\ 3.40 & \end{array} \qquad \begin{array}{l} \cos \epsilon_0 = \frac{1}{4} \\ \sin \epsilon = \sin \epsilon_0 \cos D_\oplus \\ \text{Excess} = \text{diameter} \times (1 - \cos \epsilon) \\ \qquad \qquad = \text{diameter} \times F \end{array}$$

where F is tabulated in the accompanying critical table with argument D_\oplus .

The magnitude is computed from Müller's formula

$$-8.93 + 5 \log r\Delta$$

The *Correction for Phase*, which is numerically equal to $57^{\circ}.3 (1 - k)$ or $57^{\circ}.3 \sin^2 \frac{1}{2} i$, is the correction that must be applied to the longitude of the central meridian to give the longitude of the meridian which bisects the apparent or illuminated disc. In the columns on page 589 this correction has not been applied, but on pages 590-591 it has already been applied.

The zenographical latitude D'_{\oplus} of the apparent centre of the disc is given by

$$\tan D'_{\oplus} = \sec^2 \epsilon_0 \tan D_{\oplus} = 1.148 \tan D_{\oplus}$$

or, since D_{\oplus} cannot exceed $\pm 3^{\circ}.4$

$$D'_{\oplus} = 1.148 D_{\oplus}$$

Similarly the eccentric angle D'_{\oplus} at the centre of Jupiter of the apparent centre of the disc is given by

$$D'_{\oplus} = \sec \epsilon_0 D_{\oplus} = 1.071 D_{\oplus}$$

or, with sufficient accuracy, by increasing D_{\oplus} by 7 per cent.

If the angular distance from the centre of the disc of a spot on the central meridian be denoted by d (positive to the north) and the polar semi-diameter by b , the zenocentric latitude β or the zenographical latitude β' of the spot may be determined from

$$\sin \theta = \frac{d}{b}$$

$$\beta' = \theta + D'_{\oplus}$$

$$\begin{aligned} \tan \beta &= \cos \epsilon_0 \tan \beta' = 0.9333 \tan \beta' = [9.9700] \tan \beta' \\ \tan \beta'' &= \sec \epsilon_0 \tan \beta' = 1.0714 \tan \beta' = [0.0300] \tan \beta' \end{aligned}$$

Satellites of Jupiter (Pages 592-617)

The data concerning the four brighter satellites are derived from Sampson's *Tables of the Four Great Satellites of Jupiter* (London, 1910). Certain simplifications of the tables, as described by H. Andoyer in *Bulletin Astronomique*, 32, 177 (1915) have been adopted for ephemeris purposes, so that the data given are not intended for the rigorous comparison of observation with theory.

The elongations of the Vth satellite are derived from elements deduced by J. Robertson in 1895, and published in the *Connaissance des Temps* each year. The differential co-ordinates of the VIth and VIIth satellite are derived from elements and tables given by F. E. Ross in *Lick Observatory Bulletin*, Vol. IV, No. 112 (1906) and in *Astronomische Nachrichten* 4175 (1907).

Extensive tables to facilitate the computation of accurate positions relative to Jupiter of the four brighter satellites are given each year in the *Connaissance des Temps*.

All the times given have been corrected for light-time. In the diagram on page 592 the central ellipse represents the disc of Jupiter, and the inner orbit is that of satellite V.

Before opposition eclipses may be observed on the west side of Jupiter, after opposition on the east. Before opposition the immersions of satellite I in the shadow may be observed, while after that date the emersions only are visible. The same is true in general of satellite II, although occasionally both phenomena may be seen. In the case of satellite III and IV both phases are usually visible, except near opposition. The points of immersion into and emersion from the shadow are shown pictorially at the foot of the right-hand page for each month, while at the foot of the left-hand page the rectangular co-ordinates are given, in units of the equatorial radius of Jupiter, the axis of x being parallel to the equator of Jupiter and directed positively to the east, while the axis of y is directed positively to the north pole of Jupiter. The suffix 1 refers to an immersion or commencement of the eclipse, and the suffix 2 to an emersion or finish of the eclipse.

In the diagrams of the configurations of the four brighter satellites Jupiter is represented by a light disc in the centre of the page, and the relative positions of the satellites at the times stated above the diagrams are indicated by dots. (The designation of each satellite is shown by a numeral placed to the right or left of the dot, the motion of the satellite at the instant in question being always towards the numeral. In constructing the diagrams the latitudes of the satellites are always considered to be zero, except when two or more of them happen to be at nearly the same distance from the planet, in which case they are placed one above the other, as they would appear in the sky, although no attempt has been made to represent the distance between them to scale. A light disc, accompanied by a numeral, placed at the side of the diagram indicates that the satellite is projected on to the disc of Jupiter; in other words a transit is in progress. A dark disc indicates that the satellite is invisible, either because it is occulted by Jupiter, or else because it is immersed in the shadow. The disc is placed on the right or left according as the satellite is on the right or left of the centre of Jupiter at the moment for which the configuration is given.

Rings of Saturn (Page 618)

The elements tabulated, together with some others not given in the NAUTICAL ALMANAC, but to be found in the *Berliner Jahrbuch*, are defined as follows:—

a, b = axes of the outer ellipse of the outer ring

P = position angle of the northern semi-minor axis of the rings, measured from the north and positive towards the east

B = saturnicentric latitude of the Earth referred to the plane of the rings and positive towards the north

U = geocentric longitude of Saturn, measured in the plane of the rings from their ascending node on the Earth's mean equator. $U + 180^\circ$ is the saturnicentric longitude of the Earth measured in the plane of the rings from their ascending node on the Earth's mean equator

P' = the angle which the northern semi-minor axis of the rings makes with the latitude circle through the centre of Saturn, as seen from the Sun and positive to the east

B' = saturnicentric latitude of the Sun referred to the plane of the rings and positive to the north

U' = heliocentric longitude of Saturn, measured in the plane of the rings from their ascending node on the ecliptic

Ω = ascending node of the ring-plane on the ecliptic, measured from the mean equinox

i = inclination of the rings to the ecliptic

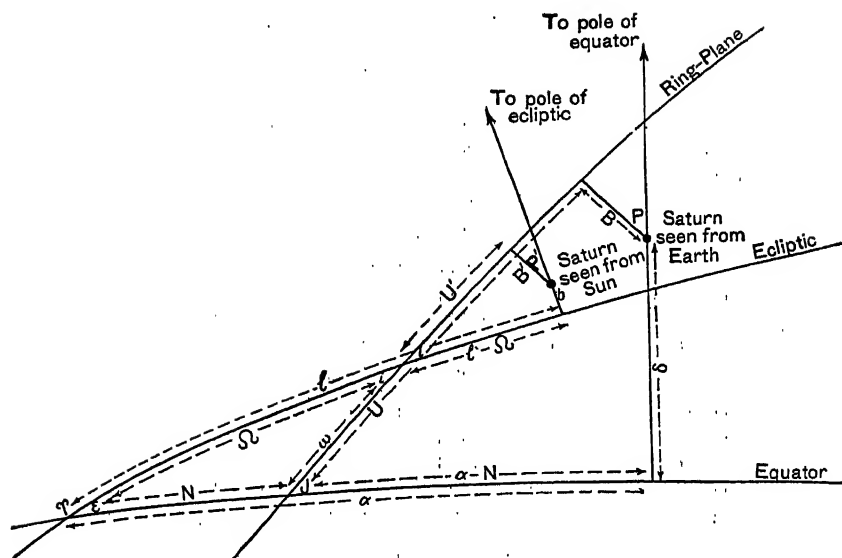
N = ascending node of the ring-plane on the Earth's mean equator, measured from the mean equinox

J = inclination of the ring-plane to the Earth's mean equator

ω = the angular distance in the plane of the rings from their ascending node on the Earth's mean equator to their ascending node on the ecliptic.

The quantities tabulated in the *Berliner Jahrbuch*, which should be consulted for more detailed information concerning the rings and satellites of Saturn, are U, B and P for every second day, a, b, U', B' and P' for every fourth day, and N, J and ω for every sixteenth day. The angles are all given to three decimals of a degree.

The geometrical significance of the above quantities may be studied in the accompanying diagram. They are all tabulated for the moment when light left Saturn, i.e. the effect of planetary aberration has been removed. To compare observed quantities with those tabulated the light time should be subtracted from the time of observation.



The outer diameter of the rings at distance 9.53887 units is, according to H. Struve, $39''.35$, corresponding to a diameter of $375''.35$ ($\log = 2.5744$) at unit distance. The minor axis b of the rings is $= a \sin B$. The relative dimensions of the rings as computed from Bessel's data, except those for the dusky ring, which are based on the observations of various astronomers, are given below in the form of factors by which a and b must be multiplied to give

	Factor	Log
The inner ellipse of the outer ring	0.8801	9.9445
The outer ellipse of the inner ring	0.8599	9.9344
The inner ellipse of the inner ring	0.6650	9.8228
The inner ellipse of the dusky ring	0.5486	9.7392

The adopted position of the ring-plane is, according to H. Struve, for the mean ecliptic and equinox of 1889.25

$$\Omega = 167^\circ 57'.0$$

$$i = 28^\circ 05'.6$$

To compute N , J and ω

$$\tan E = \tan i \cos \Omega \quad (E \text{ in 4th quadrant})$$

$$\tan N = \tan \Omega \sin E \operatorname{cosec} (E + \epsilon)$$

$$\tan J = \tan (E + \epsilon) \sec N$$

$$\tan F = \tan \epsilon \cos \Omega \quad (F \text{ in 4th quadrant})$$

$$\tan \omega = \tan \Omega \sin F \operatorname{cosec} (F + i)$$

$$\tan J = \tan (F + i) \sec \omega$$

The two values of $\tan J$ should agree.

The quantities Ω and i must be corrected for precession and shift of the ecliptic. They vary slowly, as do N , J and ω , so may be expressed by a time power series, in which T is reckoned in centuries from 1900.0.

$$\Omega = 168.09980 + 1.39351 T + 0.00041 T^2$$

$$i = 28.09193 - 0.01302 T$$

$$N = 126.40593 + 3.99960 T + 0.21732 T^2 + 0.01011 T^3 + 0.00015 T^4$$

$$J = 6.92944 - 0.44818 T + 0.01163 T^2 + 0.00078 T^3 + 0.00004 T^4$$

$$\omega = 42.86155 - 2.74230 T - 0.21709 T^2 - 0.01010 T^3 - 0.00015 T^4$$

The values for the years 1920-1950 are exhibited in the accompanying table.

RINGS OF SATURN

Date	Ω	i	N	J	ω
1920.0	168.3785	28.0893	127.2146	6.8403	42.3043
1921.0	.3925	.0892	.2555	.8358	.2760
1922.0	.4064	.0891	.2965	.8314	.2476
1923.0	.4203	.0889	.3375	.8270	.2192
1924.0	.4343	.0888	.3785	.8226	.1908
1925.0	168.4482	28.0887	127.4196	6.8181	42.1623
1926.0	.4621	.0885	.4607	.8137	.1337
1927.0	.4761	.0884	.5019	.8093	.1051
1928.0	.4900	.0883	.5431	.8049	.0765
1929.0	.5040	.0882	.5843	.8005	.0478
1930.0	168.5179	28.0880	127.6256	6.7961	42.0191
1931.0	.5318	.0879	.6670	.7916	.41.9903
1932.0	.5458	.0878	.7084	.7872	.9615
1933.0	.5597	.0876	.7498	.7828	.9326
1934.0	.5736	.0875	.7913	.7784	.9037
1935.0	168.5876	28.0874	127.8328	6.7740	41.8747
1936.0	.6015	.0872	.8744	.7696	.8457
1937.0	.6155	.0871	.9160	.7652	.8167
1938.0	.6294	.0870	.9577	.7609	.7876
1939.0	.6433	.0869	127.9994	.7565	.7584
1940.0	168.6573	28.0867	128.0412	6.7521	41.7292
1941.0	.6712	.0866	.0830	.7477	.7000
1942.0	.6851	.0865	.1248	.7433	.6707
1943.0	.6991	.0863	.1667	.7389	.6414
1944.0	.7130	.0862	.2087	.7346	.6120
1945.0	168.7270	28.0861	128.2507	6.7302	41.5826
1946.0	.7409	.0859	.2927	.7258	.5532
1947.0	.7548	.0858	.3348	.7214	.5237
1948.0	.7688	.0857	.3769	.7171	.4941
1949.0	.7827	.0856	.4191	.7127	.4645
1950.0	168.7967	28.0854	128.4613	6.7084	41.4349

In forming U , B and P the effect of nutation and planetary aberration is first removed from the apparent right ascension and declination of Saturn by subtracting from the right ascension

$(A - \tau) (m + n \sin \alpha \tan \delta) + \frac{1}{15} B \cos \alpha \tan \delta - 0.1384 \Delta \times \text{var. per hour}$
and from the declination

$(A - \tau) n \cos \alpha - B \sin \alpha - 0.1384 \Delta \times \text{var. per hour}$

We have then

$$\tan G = \tan J \sin (\alpha - N) \quad (G \text{ being between } \pm J)$$

$$\tan P = -\cos (\alpha - N) \tan J \cos G \sec (G - \delta)$$

$$\tan B = \tan (G - \delta) \cos P$$

$$\tan H = \tan \delta \operatorname{cosec} (\alpha - N)$$

$$\tan U = \cos (H - J) \tan (\alpha - N) \sec H$$

$$\tan B = -\tan (H - J) \sin U$$

H may be in either of the quadrants in which its sign is satisfied. The two values of $\tan B$ should agree.

Similarly, if l and b represent the heliocentric longitude and latitude of Saturn, referred to the mean equinox

$$\begin{aligned}\tan G' &= \tan i \sin (l - \Omega) & (G' \text{ being between } \pm i) \\ \tan P' &= -\cos (l - \Omega) \tan i \cos G' \sec (G' - b) \\ \tan B' &= \tan (G' - b) \cos P' \\ \tan H' &= \tan b \operatorname{cosec} (l - \Omega) \\ \tan U' &= \cos (H' - i) \tan (l - \Omega) \sec H' \\ \tan B' &= -\tan (H' - i) \cos U'\end{aligned}$$

Müller's formula for the magnitude may be written

$$-8.68 + 5 \log r \Delta \pm 0.044 (U' + \omega - U) - 2.60 \sin B + 1.25 \sin^2 B$$

the sign of the third term being chosen so as to make this term positive.

Satellites of Saturn (Pages 619-631)

The data concerning the satellites of Saturn (except Phoebe) are derived from the elements of H. Struve as given in *Observations de Poulkova*, Supplement I (St. Petersburg, 1888), and in *Publications de l'Observatoire Central Nicolas*, Série II, Vol. XI (St. Petersburg, 1898), and in *Astronomische Nachrichten*, 3885-86 (1903). Corrections to the orbit of Rhea are given by G. Struve in *Veröffentlichungen der Universitäts-Sternwarte zu Berlin-Babelsberg*, Vol. VI, page 16. These elements are given in full each year in the *Berliner Jahrbuch*. The differential co-ordinates of Phoebe are derived from elements and tables given by F. E. Ross in *Annals of the Harvard College Observatory*, Vol. 53, No. 6 (1905).

The times of elongation and conjunction have been corrected for light time. The differential co-ordinates of Hyperion and Japetus have not been thus corrected, so that light time must be subtracted from the time of an observation before comparing with the ephemeris.

The symbols used on pages 624-627 have already been explained under *Satellites of Mars*.

Satellites of Uranus and Neptune (Pages 632-635)

The data concerning Ariel and Umbriel, the inner satellites of Uranus, are derived from elements given by Newcomb in *Uranian and Neptunian Systems*, *Washington Observations*, 1873, Appendix I. The data concerning Titania and Oberon, the outer satellites of Uranus, are derived from elements given by H. Struve in *Abhandlungen der Königlich Preussischen Akademie der Wissenschaften*, 1912.

The data concerning the satellite of Neptune are derived from elements given by Eichelberger and Newton in *The Orbit of Neptune's Satellite and the Pole of Neptune's Equator*, in *Astronomical Papers of the American Ephemeris*, Vol. IX, Part III.

The symbols used are explained under *Satellites of Mars*.

Magnitudes of Uranus and Neptune

These may be found from Müller's formulæ:—

$$\text{For Uranus } m = -6.85 + 5 \log r \Delta$$

$$\text{For Neptune } m = -7.05 + 5 \log r \Delta$$

On account of the small variation of r the formulæ may be simplified:—

$$\text{For Uranus } m = m_0 + 5 \log \Delta$$

$$\text{For Neptune } m = +0.35 + 5 \log \Delta$$

where m_0 has the following values:—

1931	-0.35	1934	-0.36	1937	-0.38
1932	-0.35	1935	-0.37	1938	-0.38
1933	-0.36	1936	-0.37	1939	-0.39

The magnitudes at opposition in 1931 are

Uranus 6.0

Neptune 7.7

Phenomena (Pages 636-637)

The majority of the symbols used will be found on the lower half of page 637, which contains the phenomena in order of planets, except conjunctions of planets with the Moon and with each other.

The times of equinoxes and solstices are those at which the Sun's apparent longitude is a multiple of 90° . The dates of perihelion and aphelion are those on which the radius vector of the Sun is a minimum and maximum respectively. On account of lunar perturbations they do not always correspond to the dates when the longitude of the Sun is equal to the mean longitude of perigee or apogee given on page 54.

The dates of conjunction with or opposition to the Sun are those on which the differences of apparent geocentric longitudes are 0° and 180° respectively. The dates when the planets are stationary are those on which they are stationary in right ascension, but if the phenomenon occurs after 12^h the date given is that of the following midnight. Similarly the dates of elongation are those on which the differences of geocentric longitude are a maximum, no account being taken of the latitude of the planet concerned.

The times of conjunction of planets with the Moon or with one another are those at which the two bodies have the same right ascension, and these, in general, differ slightly from the times of closest approach. These conjunctions are omitted if the difference of declination is greater than 7° . Conjunctions of planets with first magnitude stars are noted when the difference of declination at conjunction does not exceed $10'$.

Sunrise and Sunset (Pages 638-659)

This table enables the time of sunrise or sunset at any place between the equator and latitude $+60^\circ$ to be obtained immediately. The times given may be regarded as local mean times of sunrise or sunset, although strictly they are the Greenwich mean times of sunrise or sunset for places on the meridian of Greenwich, and an interpolation for longitude (yielding a maximum correction of 1^m) is theoretically necessary in order to give the local mean time for a place not on the meridian of Greenwich.

At the times given the true zenith distance of the Sun's centre is $90^\circ 50'$, i.e. $34'$ has been allowed for horizontal refraction and $16'$ for semi-diameter. The beginning and ending of twilight is assumed to be the instant when the true zenith distance of the Sun's centre is 108° .

In order to avoid the necessity for a special table for southern latitudes, the time of sunrise or sunset at a southern station is found by taking the time of the same phenomenon at a northern station at the same distance from the equator on the day (about six months earlier or later) when the Sun's declination is opposite in sign but as nearly as possible equal in numerical value. To the time thus found a correction equal to the difference between the values of the equation of time on the two dates concerned must be applied.

Moonrise and Moonset (Pages 660-677)

At the times given the true geocentric zenith distance of the Moon's centre is $90^\circ 50'$ minus the Moon's horizontal parallax. Here, as in the case of the Sun, $34'$ has been allowed for horizontal refraction and $16'$ for semi-diameter.

A special table for southern latitudes is avoided by making use of the fact that, if there were no refraction or parallax, the time of rising or setting of the Moon's centre at any place would be exactly the same as the time of setting or rising at a point on the Earth diametrically opposite this place.

The corrections required to allow for refraction, semi-diameter and parallax are equal in magnitude for the two places but opposite in sign. As the correction has already been applied in the case of northern stations, it must be doubled and applied with the reversed sign in order to give correct times for southern stations.

The hour angle of the Moon is given by

$$\cos h = -\tan \phi \tan \delta + \cos z \sec \phi \sec \delta$$

where z is the zenith distance. Here $z = 90^\circ 50' - \pi$, and does not differ from 90° by more than $11'$. Hence the correction to the hour angle when $z = 90^\circ$ is

$$\begin{aligned} & \pm \frac{\sec \phi \sec \delta \sin(\pi - 50') \operatorname{cosec} 1^m}{\sqrt{1 - \tan^2 \phi \tan^2 \delta}} \\ & = \pm \frac{\sqrt{2} \sin(\pi - 50') \operatorname{cosec} 1^m}{\sqrt{\cos 2\phi + \cos 2\delta}} \end{aligned}$$

in minutes of sidereal time. This correction must be reduced to minutes of mean time, and allowance made for the average hourly motion of the Moon in right ascension, which may be taken as 140^s . Thus the factor on page 676 is

$$\pm \frac{2 \times \sqrt{2} \times 3610}{15(3610 - 140) \sqrt{\cos 2\phi + \cos 2\delta}} = \pm \frac{0.196}{\sqrt{\cos 2\phi + \cos 2\delta}}$$

The rule for signs follows immediately from the consideration that the geocentric zenith distance of the Moon's centre at the times given is always less than 90° .

Observatories (Pages 678-699)

Three separate lists of observatories are given.

List A.—Active Observatories.—The positions given are based on replies sent by the various observatories to a circular letter asking for their geographical co-ordinates. Observatories which have not replied to a third and even a fourth copy of the letter have been omitted.

Five observatories have been added to this list since 1930, namely Bloemfontein (Boyden Station of Harvard College Observatory at Mazelspoort, transferred from Arequipa), Herrsching, Jassy, Selsey and Singapore. Revised or additional data are given for Berkeley, Bombay, Budapest, Colombo, Dehra Dun, Jena, Madras, Mount Hamilton and Oxford (Radcliffe).

In the quantities $\rho \sin \phi'$, $\rho \cos \phi'$, etc. the effect of altitude has been included in every case where it is known. In view of the growing tendency towards the use of calculating machines natural as well as logarithmic values are given. The formulæ and tables used are given on pages 718 and 719, in Tables X and XI.

List B.—Former Observatories.—This list includes not only observatories which have ceased to exist or be active, but also former positions of active observatories in List A. In general only observatories of historical importance have been included. Certain omissions are due to the difficulty of obtaining the necessary data. The additions to the list since 1930 are Bremen, Slough and Uranibourg.

List C.—Index List.—Lists A and B are given in alphabetical geographical order. As many observatories are better known by special names, or by the name of the individual or institution to which they belong, List C provides a means of locating them in one of the other lists. Names of towns or suburban or country locations sometimes associated with observatories are included. References are also given in this list to all branch observatories.

The authority for the spelling of all geographical names is the leaflets published for the Permanent Committee on Geographical Names by the Royal Geographical Society, Kensington Gore, London, S.W.7.

Every effort is made to keep this list of observatories up to date. Directors and others concerned are requested to communicate any known corrections or additions.

Standard Times (Pages 700-705)

These pages show the standard times adopted in various countries. They also indicate the difference between the standard time of any country and Greenwich mean time in the sense Greenwich mean time *minus* standard time.

As changes are liable to occur in this list users should consult the latest NAUTICAL ALMANAC available. Since the present list was printed the following changes have been notified. The standard time of Kenya Colony and Protectorate has been changed from $-02^h 30^m$ to -03^h , and of Colombia from $+04^h 56^m 52^s.4$ to $+05^h$, whilst for Zanzibar the standard time -03^h has been adopted. The standard time of Luxembourg is incorrectly given as -01^h ; it should be 00^h .

In many countries the legal time is advanced during a portion of the year, and this advanced time is commonly known as *Summer Time*. In the British Isles this practice began in 1916, and was stabilised by the *Summer Time Act*, 1925, which provided

(1) The time for general purposes in Great Britain shall, during the period of summer time, be one hour in advance of Greenwich mean time.

(2) Wherever any reference to a point of time occurs in any enactment, Order in Council, order, regulation, rule, byelaw, deed, notice or other document whatsoever, the time referred to shall, during the period of summer time, be deemed, subject as hereinafter provided, to be the time as fixed for general purposes by this Act.

(3) Nothing in this Act shall affect the use of Greenwich mean time for purposes of astronomy, meteorology, or navigation, or affect the construction of any document mentioning or referring to a point of time in connection with any of those purposes.

(4) For the purposes of this Act, the period of summer time shall be taken to be the period beginning at two o'clock, Greenwich mean time, in the morning of the day next following the third Saturday in April, or, if that day is Easter Day, the day next following the second Saturday in April, and ending at two o'clock, Greenwich mean time, in the morning of the day next following the first Saturday in October.

A list of the dates of the duration of Summer Time is given below for the years 1916 to 1933. The dates for the years 1916 to 1924 do not conform to the rule now in force.

Year	Duration	Year	Duration
1916	May 21 to October 1	1925	April 19 to October 4
1917	April 8 to September 17	1926	April 18 to October 3
1918	March 24 to September 30	1927	April 10 to October 2
1919	March 30 to September 29	1928	April 22 to October 7
1920	March 28 to October 25	1929	April 21 to October 6
1921	April 3 to October 3	1930	April 13 to October 5
1922	March 26 to October 8	1931	April 19 to October 4
1923	April 22 to September 16	1932	April 17 to October 2
1924	April 13 to September 21	1933	April 9 to October 8

Tables I and II (Pages 706-709)

These tables enable the *Julian Day Number* of any day up to the year 2000 to be found. When a decimal is used with a Julian Day Number it is understood that the day commences at Greenwich mean noon.

Tables III and IV (Pages 710-711)

These tables are used for converting intervals of mean solar time into intervals of *uniform* sidereal time (see page 750) and vice versa. They are based on the following conversion ratios derived from Newcomb's value of the tropical year :—

$$1 \text{ mean solar day} = 1.00273 \, 79093 \text{ uniform sidereal days} \\ = 24^h \, 03^m \, 56^s.55536 \text{ in uniform sidereal time}$$

$$1 \text{ uniform sidereal day} = 0.99726 \, 95664 \text{ mean solar days} \\ = 23^h \, 56^m \, 04^s.09054 \text{ in mean solar time.}$$

When three decimals of a second are retained, as in the most refined modern time-keeping, these tables are used for connecting mean solar and uniform sidereal times. When keeping time to $0^s.01$ only, and neglecting short-period terms of nutation in right ascension, the tables are used in the manner illustrated for connecting mean solar and true sidereal time.

Tables V-IX (Pages 712-717)

These conversion tables require no explanation. Decimals of a day may be converted to hours, minutes and seconds by the inverse use of Table IX.

Tables X and XI (Pages 718-719)

These tables are based on a compression c of $\frac{1}{297.0}$. The series on which they are based, together with the series for ρ , the ratio of the radius to the equatorial radius, are given below, with terms up to c^3 .

$$S = \frac{\rho \sin \phi'}{\sin \phi} = 1 - \frac{3}{2}c + \frac{5}{16}c^2 + \frac{3}{32}c^3 - \left(\frac{c}{2} - \frac{c^2}{2} - \frac{5}{64}c^3\right) \cos 2\phi \\ + \left(\frac{3}{16}c^2 - \frac{3}{32}c^3\right) \cos 4\phi - \frac{5}{64}c^3 \cos 6\phi$$

$$C = \frac{\rho \cos \phi'}{\cos \phi} = 1 + \frac{1}{2}c + \frac{5}{16}c^2 + \frac{7}{32}c^3 - \left(\frac{c}{2} + \frac{c^2}{2} + \frac{27}{64}c^3\right) \cos 2\phi \\ + \left(\frac{3}{16}c^2 + \frac{9}{32}c^3\right) \cos 4\phi - \frac{5}{64}c^3 \cos 6\phi$$

$$\rho = 1 - \frac{1}{2}c + \frac{5}{16}c^2 + \frac{5}{32}c^3 + \left(\frac{c}{2} - \frac{13}{64}c^3\right) \cos 2\phi \\ - \left(\frac{5}{16}c^2 + \frac{5}{32}c^3\right) \cos 4\phi + \frac{13}{64}c^3 \cos 6\phi$$

These reduce to

$$S = 0.99495304 - 0.00167783 \cos 2\phi + 0.00000212 \cos 4\phi$$

$$C = 1.00168705 - 0.00168919 \cos 2\phi + 0.00000214 \cos 4\phi$$

$$\rho = 0.99832005 + 0.00168349 \cos 2\phi - 0.00000355 \cos 4\phi + 0.00000001 \cos 6\phi$$

Table XII (Pages 720-721)

This table enables approximate precessions to $0^s.01$ and $0''.1$ for declinations less than $\pm 60^\circ$ to be found at sight. For all declinations the argument for p is α ; it must not be taken as $\alpha \pm 12^h$ for southern declinations.

Tables XIII and XIV (Pages 722-724)

These tables are for the rigorous reduction of star positions from the equinox of the beginning of the year to that of 1950.0, and will be useful in cases where accurate precessions and secular variations are not known. They have the advantage of involving functions of the right ascension and declination at the initial epoch only, and not at the mid-epoch. They are based on Ristenpart's formulæ:—

$$a = \alpha_0 + \zeta_0$$

$$A = \zeta_0 + z + \frac{\sin^2 \theta \sin 2a}{4 \sin 1''}$$

$$A_1 = \frac{\sin \theta \sin a}{\sin 1''}$$

$$A_2 = \frac{\sin^2 \theta \sin 2a}{2 \sin 1''}$$

$$D = \frac{\sin \theta \cos a}{\sin 1''}$$

$$D_1 = - \frac{\sin^2 \theta \sin^2 a}{2 \sin 1''}$$

These reduce, for working purposes, to

$$A = \zeta_0 + z + \frac{A_2}{2} = M + \frac{A_2}{2}$$

$$p = \frac{\sin \theta \cos \zeta_0}{15 \sin 1''} \quad q = \frac{\sin \theta \sin \zeta_0}{15 \sin 1''}$$

$$A_1 = p \sin \alpha + q \cos \alpha$$

$$A_2 = 0.0000048481 A_1 D$$

$$D = -15 \times \text{value of } A_1 \text{ for } \alpha - 6^h$$

$$D_1 = -0.00054542 A_1^2$$

For stars near the pole the formulæ on page 757 may be used.

Table XV (Page 725)

This table is intended to facilitate the approximate reduction from the standard equinox of 1950.0 to the true equinox of date of ephemerides of comets and minor planets. The dates are those adopted at the Leiden meeting of the International Astronomical Union in the following resolution: "That the dates used in giving the osculation epochs of elements for comets and minor planets shall be the midnight following an integral Julian date which is exactly divisible by 40, and, for ephemerides, divisible by 8 (or 4 etc.)." The dates marked with an asterisk are the osculation dates.

The formulæ for f , g and G are

$$f = M + f_0$$

M being given on page 54, and being the reduction to the beginning of the year, and f_0 being the independent day number f given on pages 270-284.

$$g \sin G_0 = \frac{1}{60} B$$

$$g \cos G_0 = N' + n' A$$

$$G = G_0 - 1^s.5 (1950-1931)$$

N' and n' being the values of N'' and n'' on page 54 reduced to minutes of arc. n' may be taken as $\frac{1}{3}$, and, since $g \sin G_0$ is very small in comparison with $g \cos G_0$

$$g = -g \cos G_0 - \frac{(g \sin G_0)^2}{2g \cos G_0}$$

The quantities j and J on page 290 are related to the quantities g and G as follows:—

$$j = 0.262 g \quad J = G - 6^h$$

Tables XVI-XIX (Pages 726-729)

These tables have been included to facilitate the interpolation of the quantities contained in the NAUTICAL ALMANAC. Two separate cases are to be recognised; first, when finite differences are to be used, and secondly, when the variation of the quantity is given for the same moment as that for which it is tabulated.

For interpolation with finite differences either Bessel's or a modified Everett formula may be used. The notation commonly employed in astronomical usage is

Function	Differences				
	First	Second	Third	Fourth	Fifth
f_{-2}	$\Delta'_{\frac{1}{2}}$				
f_{-1}	$\Delta'_{\frac{1}{2}}$	Δ''_1			
f_0	$\Delta'_{\frac{1}{2}}$	Δ''_0	$\Delta'''_{\frac{1}{2}}$	Δ^{iv}_0	
f_1	$\Delta'_{\frac{1}{2}}$	Δ''_1	$\Delta'''_{\frac{1}{2}}$	Δ^{iv}_1	$\Delta^v_{\frac{1}{2}}$
f_2	$\Delta'_{\frac{1}{2}}$	Δ''_2	$\Delta'''_{\frac{3}{2}}$		
f_3	$\Delta'_{\frac{1}{2}}$				

which, for our present purpose, may be simplified thus

Function	Differences				
f_0		Δ'_0		Δ''_0	
	Δ'		Δ'''		Δ''''
f_1		Δ''_1		Δ'''_1	

Bessel's formula may be written

$$f_n = f_0 + n \Delta' + B'' \frac{\Delta''_0 + \Delta''_1}{2} + B''' \Delta''' + B^{iv} \frac{\Delta'''_0 + \Delta'''_1}{2} + B^v \Delta''''$$

where

$$\begin{aligned} B'' &= \frac{n(n-1)}{2!} \\ B''' &= \frac{n(n-1)(n-\frac{1}{2})}{3!} \\ B^{iv} &= \frac{(n+1)(n)(n-1)(n-2)}{4!} \\ B^v &= \frac{(n+1)(n)(n-1)(n-2)(n-\frac{1}{2})}{5!} \end{aligned}$$

The modified Everett formula is

$$f_n = f_0 + n \Delta' + E_0 \Delta''_0 + E_1 \Delta''_1 + B^{iv} \frac{\Delta'''_0 + \Delta'''_1}{2}$$

where

$$\begin{aligned} E_0 &= -\frac{n(n-1)(n-2)}{6} \\ E_1 &= \frac{n(n+1)(n-1)}{6} \end{aligned}$$

The use of four terms of Everett's formula is exactly equivalent to the use of four terms of Bessel's formula; in other words it includes the effect of third differences.

The number of differences to be used in any particular problem must be determined by the computer; it is governed by the simple condition that the effect of the neglected differences must be negligible in comparison with the working unit.

The choice of formula is often a matter of individual preference, but the following scheme may be found helpful. If the third and higher differences are negligible use Bessel's formula. If the fourth and higher differences are negligible the use of Everett's formula has the advantage of avoiding the necessity for finding the third difference; a good illustration of the application of this principle is in the interpolation of the Sun's co-ordinates *X Y Z* where second differences are printed and fourth differences are always negligible. When fourth differences must be included, either formula may be used. The maximum value of the coefficient B^v is less than 0.001, so that it is always negligible when interpolating quantities in the NAUTICAL ALMANAC.

Table XVI is a critical table of B'' (which is always negative) to three decimals. Since values obtained from this table are always correct to within ± 0.0005 , these coefficients, when used with values of $\frac{\Delta''_0 + \Delta''_1}{2}$ less than 1000, will not lead to a greater error (arising from the second difference contribution only) than half a unit of the last decimal. When the value of the second difference exceeds this limit (in which case also the third difference is usually appreciable) the four-decimal values of E_0 and E_1 in Table XVII should be used. It may be remarked that $E_0 + E_1 = B''$. Tables of E_0 and E_1 to 10 decimals for every 0.001 are given in Thompson's *Table of the Coefficients of Everett's Central-Difference Interpolation Formula* (Cambridge University Press). Chappell's *Interpolation Coefficients*, which have appeared while these notes were in the press, contain coefficients for Bessel's, Gauss's and Everett's formulæ for every 0.001. B''' and B^{iv} are also tabulated in Table XVII.

Example. What is the value of X for 1931 Feb. 28^d-7535, from the data on page 31?

Bessel's formula			Everett's formula		
f_0		$= +0.9213292$	f_0		$= +0.9213292$
$+0.7535 \times +64553$	$= +$	486407	$+0.7535 \times +64553$	$= +$	486407
-0.093×-2808	$= +$	2611	-0.0386×-2802	$= +$	1082
-0.008×-13	$= +$	1	-0.0543×-2815	$= +$	1529
Sum $= f_n$	$=$	$+0.9262194$	Sum $= f_n$	$=$	$+0.9262194$

For interpolation with printed variations the following notation is used

Function	Variations			
f_{-2}	V_{-2}	V'_{-2}		
f_{-1}	V_{-1}	V'_{-1}	V''_{-1}	
f_0	V_0	V'_0	V''_0	V'''_0
f_1	V_1	V'_1	V''_1	V'''_1
f_2	V_2	V'_2		

where $V'_1 = V_1 - V_0$ and $V''_0 = V'_1 - V'_2$ etc. If the variations are computed for unit interval of the argument of the function, they are related to the differences as follows

$$V_0 = \frac{\Delta'_{-1} + \Delta'_1 - \frac{1}{2}(\Delta'''_{-1} + \Delta'''_1) + \frac{1}{24}(\Delta^v_{-1} + \Delta^v_1)}{2}$$

$$V'_1 = \frac{\Delta''_0 + \Delta''_1 - \frac{1}{2}(\Delta^{iv}_0 + \Delta^{iv}_1)}{2}$$

$$V''_0 = \frac{\Delta'''_{-1} + \Delta'''_1 - \frac{1}{2}(\Delta^v_{-1} + \Delta^v_1)}{2}$$

When the variations are given for smaller units of time the variations yielded by the above formulæ must be reduced proportionately.

For simplicity the notation may now be changed to

Function	Variations		
	V'	V''	V'''
f_0	V	V''	V'''

with the understanding that the V' and V''' used are those on the same side of f_0 as f_n . Then

$$f_{\pm n} = f_0 \pm nV + \frac{n^2}{2}V' \pm \frac{n^2(2n-3)}{12}V'' + \frac{n^2(n^2-2)}{24}V'''$$

when the variation V is for unit interval of the argument and n is also in units of that interval.

If variations per hour are given and h is measured in hours

$$f_{\pm h} = f_0 \pm hV + h^2V' \pm h^3V'' + h^4V'''$$

where

	Interval 24 ^h	Interval 12 ^h
h'	$\frac{h^2}{48}$	$\frac{h^2}{24}$
h''	$\frac{h^2(2h-72)}{6912}$	$\frac{h^2(2h-36)}{1728}$
h'''	$\frac{h^2(h^2-1152)}{331776}$	$\frac{h^2(h^2-288)}{41472}$

Table XVIII gives values of h' to two decimals for interval 24^h and may be used when V' does not exceed 100 units of the last decimal of the function (note, however, that variations are usually given to one decimal more than functions); for interval 12^h values obtained from this table must be doubled.

When the variations are large, as in the case of Mercury, or the Moon at Transit, h' must be computed specially, while h'' and h''' are taken from Table XIX.

Example. What is the right ascension of Jupiter on 1931 February 28^d 04^h?

$$\begin{array}{rcl} f_0 & = & 06^h 45^m 56^s.32 \\ 4 \times -0.261 & = & -1.044 \\ 0.33 \times +0.035 & = & +0.012 \\ \text{Sum} & = & f_h = 06^h 45^m 55^s.29 \end{array}$$

Example. What is the right ascension of the Moon's illuminated limb at upper transit at Cape of Good Hope on 1931 February 26? For a fixed observatory the coefficients h , h' , h'' , h''' depend on the longitude and are constant. Taking the longitude of the transit circle as $-01^h 13^m 54^s.54$, we find, as the value of any function at transit at Cape

$$\text{Value at transit at Greenwich} = 1.23182 V + 0.0632 V' + 0.029 V'' - 0.01 V'''$$

From page 166:—

	V	V'	V''	V'''
Feb. 25 U	+144.32			
26 L	150.36	+6.04	-0.50	
26 U	155.90	+5.54	-0.89	-0.39
27 L	160.55	+4.65		

$$\begin{array}{rcl} f_0 & = & 05^h 15^m 45^s.74 \\ -1.23182 \times +155.90 & = & -3 12.041 \\ +0.0632 \times +5.54 & = & +0.350 \\ +0.029 \times -0.89 & = & -0.026 \\ -0.01 \times -0.39 & = & +0.004 \\ \text{Sum} & = & 05^h 12^m 34^s.03 \end{array}$$

In the case of the hourly ephemeris of the Moon, where variations per minute are given, if m is measured in minutes

$$f_{\pm m} = f_0 \pm mV + \frac{m^2}{120} V'$$

The value of $\frac{m^2}{120}$ is given in Table XVIII as m' .

Example. What is the Moon's declination on 1931 February 26^d 10^h 50^m?

$$\begin{array}{rcl} \text{Dec. at } 11^h & = & f_0 = +27^{\circ} 14' 46''.9 \\ -10 \times +4.987 & = & -49.87 \\ 0.8 \times -0.151 & = & -0.12 \\ \text{Sum} = \text{Dec. at } 10^h 50^m & = & +27^{\circ} 13' 56''.9 \end{array}$$

THE DERIVATION OF QUANTITIES CONTAINED IN THE NAUTICAL ALMANAC

In order to make clear the procedure followed in deriving the quantities in the NAUTICAL ALMANAC, the following illustrations have been prepared.

Most of the tabulated quantities have been computed with one decimal more than is printed; for this reason many of the examples contain this extra decimal. In some cases it will be found that the values derived in the examples differ by a unit of the last decimal from that printed; this is due mainly to the fact that many of the quantities now tabulated for midnight were actually calculated several years ago, but for noon, and have since been interpolated to midnight; the differences are, however, unimportant.

The examples are for the date 1931 February 28, unless otherwise specified.

In the formulæ T denotes Julian centuries of 36525 days, measured from Greenwich Mean Noon on 1900 January 0 (J. D. 2415020.0), unless otherwise stated.

The list of mathematical tables given in the *British Astronomical Association Handbook for 1929* includes most of the logarithmic and trigonometrical tables used in compiling the ALMANAC. The calculating machines in use are Nova-Brunsviga, Brunsviga-Dupla, Monroe, Mercedes, Burroughs, Comptometer and Hollerith.

VARIATIONS

Using the notation of page 800, the variation of a tabulated quantity in the unit of time represented by the interval between successive tabulations is

$$\frac{\Delta'_{-1} + \Delta'_1 - \frac{1}{2}(\Delta'''_{-1} + \Delta'''_1) + \frac{1}{24}(\Delta^v_{-1} + \Delta^v_1)}{2}$$

This quantity must be divided by the appropriate factor to give the variation per hour or per minute as the case may be. The term $\frac{1}{24}(\Delta^v_{-1} + \Delta^v_1)$ is usually negligible.

The calculation of the variation per hour of longitude of the transit of the Moon's limb I at the moment of upper transit at Greenwich on February 28 is illustrated.

Date	R.A.	Δ'	Δ''	Δ'''	Δ^{iv}	Δ^v
Feb. 27 L	^h 05 ^m 47 ^s 25.61	^m 32 28.33				
27 U	06 19 53.94	32 59.67	+31.34	-19.51		
28 L	06 52 53.61	33 11.50	+11.83	-19.48	+0.03	+2.18
28 U	07 26 05.11	33 03.85	-7.65	-17.27	+2.21	+1.93
Mar. 1 L	07 59 08.96	32 38.93	-24.92	-13.13	+4.14	
1 U	08 31 47.89	32 00.88	-38.05			
2 L	09 03 48.77					
		^m 33 11.50 + ^m 33 03.85			^s 3975.35	
		- $\frac{1}{2}(-19.48 - 17.27)$			+ 6.12	
		+ $\frac{1}{24}(+2.18 + 1.93)$			+ 0.14	
		Sum			3981.61	
		$\frac{1}{24}$ sum = variation per hour of longitude			165.90	

This result differs by 0.01 from the value on page 166, because the terms in Δ^v were neglected, their maximum effect being 0.01. They will, however, be included in the ALMANACS for 1934 and subsequent years.

1—*Fraction of Year*

Day of year (page 2) = 58

Length of tropical year = 365.2422 days

Hence fraction (page 2) = $\frac{58}{365.2422} = 0.159$

In computing τ , the fraction of the year from the commencement of the Besselian fictitious year, i.e. January 1^d.3216 (No. 2) the day of the year must be diminished by 0^d.3216.

$$\tau \text{ (page 273)} = \frac{58 - 0.3216}{365.2422} = 0.15792$$

2—*Commencement of the Besselian Fictitious Year*

This is defined as the moment when the Sun's mean longitude, affected by aberration, is 280°. Alternatively, taking the constant of aberration as 20".47, it may be defined as the moment when the Sun's mean longitude, freed from aberration, is 280° 00' 57". Hence for 1931, from page 54, the date is

$$\text{Jan. 1}^{\text{d}} + \frac{280.0057 - 279.6887}{0.98564} = \text{Jan. 1}^{\text{d}}.3216 \text{ (page 2)}$$

3—*Obliquity of the Ecliptic*

The fundamental formula (Newcomb's *Tables of the Sun*, page 10) is

$$\epsilon = 23^{\circ} 27' 08''.26 - 46''.845 T - 0''.0059 T^2 + 0''.00181 T^3$$

Putting $T = .31$ and noting that the terms in T^2 and T^3 are insensible yields the value given on page 54 as the mean obliquity for the beginning of the year. The mean obliquity of date may be obtained by adding to this $-0''.468 \times$ fraction of year, and the apparent or true obliquity by the further addition of the nutation in obliquity, which is equal to $-B$ (pages 262-269).

ϵ for 1931.0 $-0''.468 \times 0.159$ $-B$ (page 263) Sum = ϵ for Feb. 28 ^d .0	$23^{\circ} 26' 53''.74$ -0.07 $+9.15$ $23^{\circ} 27' 02''.82$
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If it is desired to include the effect of the short-period terms of nutation this may be done by the further addition of $-B'$ (page 263), i.e. of $-0''.10$.

4—*Sun's Longitude*

The Sun's longitude, as obtained from Newcomb's *Tables of the Sun*, is referred to the mean equinox of date, and is unaffected by aberration.

From <i>Tables</i> , longitude, mean equinox of date	338° 26' 54".59
Precession from beginning of year (page 9)	+ 7.94
Difference = longitude, mean equinox of 1931.0 (page 9)	338 26 46.65
Longitude, mean equinox of 1931.0	338 26 46.65
Add precession from beginning of year (page 9)	+ 7.94
Add nutation (page 9)	- 3.81
Subtract aberration (page 54)	-20.66
Sum = apparent longitude (no longer tabulated in the ALMANAC)	338 26 30.12
Longitude, mean equinox of 1931.0 (page 9)	338 26 46.65
α (page 54)	15 55.04
Sum = longitude, mean equinox of 1950.0 (page 39)	338 42 41.69

The Sun's mean longitude, according to Newcomb is

$$279^{\circ} 41' 48''.04 + 129602768''.13 T + 1''.089 T^2 \\ = 279^{\circ}.69668 + 0^{\circ}.9856473354 d + 0^{\circ}.0003025 T^2$$

where d is measured in days from the epoch 1900 January 0^d.0, and T in Julian centuries.

For 1931 January 1^d 0^h

Julian day (page 2)	2426342.5
Julian day at epoch (page 709)	2415020.0
Days elapsed	11322.5
Longitude at epoch	279.69668
$0^{\circ}.9856473354 \times 11322.5 - 30 \times 360^{\circ}$	359.99196
$0^{\circ}.0003025 \times 0.31^2$	0.00003
Sum = mean longitude (page 54)	279.68867
	= $279^{\circ} 41' 19''.2$

5—Sun's Latitude

Newcomb's *Tables of the Sun* give the value referred to the mean ecliptic. The reduction to the ecliptic of the beginning of the year is $-0''.47 \tau \sin(\lambda_0 + c)$ and the further reduction to the mean ecliptic of 1950.0 is $b \sin(\lambda_0 + c)$, where λ_0 is the longitude for 1931.0, and τ is the fraction of the year.

λ_0 (page 9)	$338^{\circ} 27'$
c (page 54)	5 49
$\lambda_0 + c$	344 16
$\sin(\lambda_0 + c)$	-0.271
τ (page 2)	0.16
b (page 54)	$8''.95$

From Newcomb's <i>Tables</i>	$+0''.93$
$-0''.47 \times 0.16 \times -0.27$	$+0''.02$
Sum = latitude for 1931.0 (page 9)	$+0''.95$
$8''.95 \times -0.271$	-2.43
Sum = latitude for 1950.0 (page 39)	-1.48

6—Sun's Radius Vector

From Newcomb's <i>Tables</i> , log R (page 9)	9.9958 9752
Hence R (page 39)	0.9905 9817

7—Sun's Apparent Right Ascension and Declination

Sun's apparent longitude (No. 4)	= $\lambda = 338^{\circ} 26' 30''.12$
Sun's apparent latitude (No. 5)	= $\beta = +0''.93$
Apparent obliquity of ecliptic (No. 3)	= $\epsilon = 23^{\circ} 27' 02''.82$

The formulae may be written :—

$$\tan \alpha = \tan \lambda \cos \epsilon - \sec \lambda \tan \beta \sin \epsilon \\ \sin \delta = \sin \lambda \cos \beta \sin \epsilon + \sin \beta \cos \epsilon$$

or, since β is very small and $\cos \lambda = \cos \alpha \cos \delta \sec \beta$

$$\tan \alpha_0 = \tan \lambda \cos \epsilon \\ \Delta \alpha = -\frac{1}{\tan^2 \alpha} \cos \alpha \sec \delta \sin \epsilon \beta'' = F_{\alpha} \beta'' \\ \alpha = \alpha_0 + \Delta \alpha \\ \sin \delta_0 = \sin \lambda \sin \epsilon \\ \Delta \delta = \sec \delta \cos \epsilon \beta'' = F_{\delta} \beta'' \\ \delta = \delta_0 + \Delta \delta$$

Two small critical tables give F_α and F_δ

α				F_α				α				δ		F_δ	
h	m	h	m					h	m	h	m				
12	00	12	00					00	00	24	00	0	00		
13	10	10	50	+0.026-				01	10	22	50	7	20	0.92	
13	38	10	22	+ .025-				01	38	22	22	11	07	.93	
14	00	10	00	+ .024-				02	00	22	00	13	52	.94	
14	18	09	42	+ .023-				02	18	21	42	16	18	.95	
14	34	09	26	+ .022-				02	34	21	26	18	03	.96	
14	48	09	12	+ .021-				02	48	21	12	19	47	.97	
15	01	08	59	+ .020-				03	01	20	59	21	20	.98	
15	13	08	47	+ .019-				03	13	20	47	22	46	0.99	
15	25	08	35	+ .018-				03	25	20	35	23	30	1.00	
15	36	08	24	+ .017-				03	36	20	24	<i>In critical cases ascend</i>			
15	46	08	14	+ .016-				03	46	20	14				
15	56	08	04	+ .015-				03	56	20	04				
16	06	07	54	+ .014-				04	06	19	54				
16	15	07	45	+ .013-				04	15	19	45				
16	24	07	36	+ .012-				04	24	19	36				
16	33	07	27	+ .011-				04	33	19	27				
16	42	07	18	+ .010-				04	42	19	18				
16	51	07	09	+ .009-				04	51	19	09				
16	59	07	01	+ .008-				04	59	19	01				
17	07	06	53	+ .007-				05	07	18	53				
17	16	06	44	+ .006-				05	16	18	44				
17	24	06	36	+ .005-				05	24	18	36				
17	32	06	28	+ .004-				05	32	18	28				
17	40	06	20	+ .003-				05	40	18	20				
17	48	06	12	+ .002-				05	48	18	12				
17	56	06	04	+ .001-				05	56	18	04				
18	00	06	00	0.000				06	00	18	00				

In critical cases ascend

The sign of F_α is to be taken from the same side as the argument. F_δ is always positive.

log tan λ	9.596 6920n	log sin λ	9.565 1955n
log cos ϵ	9.962 5598	log sin ϵ	9.599 8407
Sum = log tan α_0	9.559 2518n	Sum = log sin δ_0	9.165 0362n
α_0	$22^{\text{h}} 40^{\text{m}} 18^{\text{s}}.431$	δ_0	$-8^{\circ} 24' 30''.63$
$-0.025 \times + 0''.93$	$- 0.023$	$0.93 \times + 0''.93$	$+ 0.86$
α (page 8)	$22 40 18.408$	δ (page 8)	$-8 24 29.77$

The trigonometrical tables used are Peters, *Logarithmic Table to Seven Places of Decimals for every Second of the Quadrant*, and Herz, *Siebenstellige Logarithmen für jede Zeitsecunde*.

The apparent right ascension and declination at transit at Greenwich are found by interpolating to the time of meridian passage, i.e. to 12^{h} — tabulated equation of time, interpolated to noon. If F is the fraction of a day at which transit occurs

$$\alpha = \alpha_0 + F\Delta' - 0.062 (\Delta'_0 + \Delta'_1)$$

$$\delta = \delta_0 + F\Delta' - 0.062 (\Delta'_0 + \Delta'_1)$$

	R.A.	Δ'	Δ''	Dec.	Δ'	Δ''
Feb. 28 ^d .0	$22^{\text{h}} 40^{\text{m}} 18^{\text{s}}.41$		$-0^{\circ}.57$	$-8^{\circ} 24' 29''.8$		$+7''.3$
		$+3^{\text{m}} 45^{\text{s}}.62$			$+22' 36''.0$	
29 .0	22 44 04 .03		-0.55	$-8 01 53 .8$		$+6.8$

12^{h} — equation of time (page 8)

F (page 716)

$12^{\text{h}} 12^{\text{m}} 49^{\text{s}}$

$0^{\text{d}}.50890$

α_0, δ_0	$22^{\text{h}} 40^{\text{m}} 18^{\text{s}}.41$	$-8^{\circ} 24' 29''.8$
$0.50890 \times \Delta'$	$+ 1 54.818$	$+ 11 30.07$
$-0.062 \times (\Delta'_0 + \Delta'_1)$	$+ 0.069$	$- 0.87$
α, δ (page 23)	$22 42 13.30$	$-8 13 00.6$

8—Equation of Time

Formula :— Sidereal Time at $0^{\text{h}} \pm 12^{\text{h}}$ — Sun's apparent R.A.

R.A. of mean sun (page 8)	$22^{\text{h}} 27^{\text{m}} 23^{\text{s}}.892$
Sun's apparent R.A. (page 8)	$22 40 18.408$
Equation of time (page 8)	$-12 54.516$

9—Sun's Semi-diameter

$$\text{Semi-diameter} = \frac{961''.18}{R}$$

$$R \text{ (page 39)} \quad 0.990 5982$$

$$961''.18 \div R \text{ (page 8)} \quad 16' 10''.30$$

The semi-diameter in arc at transit at Greenwich is taken as being half-way between the midnight values, i.e. $16' 10''.19$ (page 23). The semi-diameter in seconds of sidereal time is

$$\begin{aligned} & \frac{\text{S. D. in arc} \times \sec \delta \times 3609.8565}{15 \times (3609.8565 - \Delta\alpha)} \\ & = \text{S. D. in arc} \times \sec \delta \times S \end{aligned}$$

where $\Delta\alpha$ is the variation per hour of longitude of the Sun's right ascension and S is the factor $\frac{3609.8565}{15 (3609.8565 - \Delta\alpha)}$ as tabulated in the following critical table, the quantity 3609.8565 being the number of sidereal seconds in one hour of mean time.

Δa	S	Δa	S	Δa	S
8 ^s 900		9 ^s 654		10 ^s 407	
8 ^s 953	0.066832	9 ^s 707	0.066846	10 ^s 461	0.066860
9 ^s 007	0.066833	9 ^s 761	0.066847	10 ^s 515	0.066861
9 ^s 061	0.066834	9 ^s 815	0.066848	10 ^s 569	0.066862
9 ^s 115	0.066835	9 ^s 869	0.066849	10 ^s 623	0.066863
9 ^s 169	0.066836	9 ^s 923	0.066850	10 ^s 677	0.066864
9 ^s 223	0.066837	9 ^s 977	0.066851	10 ^s 730	0.066865
9 ^s 276	0.066838	10 ^s 031	0.066852	10 ^s 784	0.066866
9 ^s 330	0.066839	10 ^s 085	0.066853	10 ^s 838	0.066867
9 ^s 384	0.066840	10 ^s 138	0.066854	10 ^s 892	0.066868
9 ^s 438	0.066841	10 ^s 192	0.066855	10 ^s 946	0.066869
9 ^s 492	0.066842	10 ^s 246	0.066856	11 ^s 000	0.066870
9 ^s 546	0.066843	10 ^s 300	0.066857	11 ^s 053	0.066871
9 ^s 600	0.066844	10 ^s 354	0.066858	11 ^s 107	0.066872
9 ^s 654	0.066845	10 ^s 407	0.066859	11 ^s 161	0.066873

In critical cases ascend

S. D. in arc (page 23)	970 ^s .19
δ (page 23)	-8 ^s 13'.0
Δa (page 23)	9 ^s .400
sec δ	1.01037
S	0.066841
S. D. in sidereal time (p. 23)	65 ^s .52

10—*Sidereal Time at 0^h*

This is equal to the right ascension of the mean sun, affected by aberration, + 12^h + nutation in right ascension (long-period terms only). The right ascension of the mean sun, affected by aberration, is, according to Newcomb

$$18^h 38^m 45^s.836 + 8640184^s.542 T + 0^s.0929 T^2$$

Date 1931 Feb. 28 ^d 0 ^h (page 2)	= J. D. 2426400.5
Epoch of formula (page 709)	= J. D. 2415020.0
Interval elapsed	11380.5
Fraction of a century of 36525 ^d	0.3115811088

Right ascension at epoch	18 ^h 38 ^m 45 ^s .836
12 ^h	12
0.3115811088 \times 8640184 ^s .542	31 ^d 03 48 38.280
0.312 ^s \times 0 ^s .0929	+0.009
Nutation in R.A. (long-period terms only) (No. 13)	-0.233
Sum = sidereal time at 0 ^h (page 8)	10 27 23.892

11—*Precession in Longitude*

Formula :— Precession in longitude = $p\tau$

p (page 54)	50 ^s .2633
τ (No. 1)	0.15792
Precession in longitude (page 9)	7 ^s .94

12—*Nutation in Longitude*

This does not include short-period terms.

Formula :—

$$\begin{aligned}
 &-(17.234 + 0.017 T) \sin \Omega \\
 &+ 0.209 \sin 2\Omega \\
 &- 1.272 \sin 2L \\
 &+ 0.126 \sin (L - \pi) \\
 &- 0.050 \sin (3L - \pi) \\
 &+ 0.021 \sin (L + \pi) \\
 &+ 0.012 \sin (2L - \Omega)
 \end{aligned}$$

From page 55

From page 54

$$\Omega = 16^\circ 32'.5$$

$$L = 336^\circ 86$$

$$\pi = 281^\circ 76$$

noting that π increases by 0.0172 per year.

-17.239 sin 16.542	-4.908
+ 0.209 sin 33.08	+ 0.114
- 1.272 sin 313.72	+ 0.920
+ 0.126 sin 55.10	+ 0.103
- 0.050 sin 8.82	- 0.008
+ 0.021 sin 258.62	- 0.021
+ 0.012 sin 297.18	- 0.011
Sum = nutation in longitude (page 9)	- 3.811

In actual practice the nutation is computed, not in the manner illustrated, but from special tables based on the formula given.

13—*Nutation in Right Ascension*

$$\text{Long-period terms} = \frac{1}{18} (A - \tau) \psi \cos \epsilon$$

$$\text{Short-period terms} = \frac{1}{18} A' \psi \cos \epsilon$$

where ψ is the luni-solar precession. The factor $\frac{1}{18} \psi \cos \epsilon$ is $3.0807 + 0.0006 T$ and may be taken as 3.081 throughout this century.

A (page 263)	+0.0823
τ (page 273)	0.1579
$A - \tau$	-0.0756
$3.081 (A - \tau)$	-0.233
A' (page 263)	+0.0001
$3.081 A'$	0.000
Total nutation in R.A. (page 9)	-0.233

14—*Transit of the First Point of Aries*

Formula :— The mean time equivalent of (24^h - sidereal time at 0^h)

	h m s
Sidereal time at 0^h (page 8)	10 27 23.892
24^h - sidereal time at 0^h	13 32 36.108
Mean time equivalents 13^h	12 57 52.216
(page 711) 32^m	31 54.758
36^s	35.902
0.108	0.108
Transit of the first point of Aries (page 9)	13 30 22.984

15—*Sun's Co-ordinates X, Y, Z*
 Formulæ :—

$$X = R \cos \lambda$$

$$Y = R (\sin \lambda \cos \epsilon - \sin \beta \sin \epsilon)$$

$$Z = R (\sin \lambda \sin \epsilon + \sin \beta \cos \epsilon)$$

Replacing $\sin \beta$ by $\beta \sin 1''$ (β being in seconds) and expressing $\sin \epsilon \sin 1''$ and $\cos \epsilon \sin 1''$ in units of the eighth decimal

	$X = R \cos \lambda$	
	$Y = R (\sin \lambda \cos \epsilon - 193 \beta)$	
	$Z = R (\sin \lambda \sin \epsilon + 445 \beta)$	
	1931.0	1950.0
R (No. 6)	0.9905 9817	0.9905 9817
$\sin \epsilon$ (page 54)	0.3979 2078	0.3978 8119
$\cos \epsilon$ (page 54)	0.9174 1978	0.9174 3695
λ (No. 4)	338° 26' 46".65	338° 42' 41".69
$\sin \lambda$ (Gifford's Tables)	- 0.3673 7323	- 0.3630 6291
$\cos \lambda$ (Gifford's Tables)	+ 0.9300 7361	+ 0.9317 6462
β (No. 5)	+ 0".95	- 1".48
$\sin \lambda \cos \epsilon$	- 0.3370 3547	- 0.3330 8733
- 193 β	- 183	+ 286
Sum	- 0.3370 3730	- 0.3330 8447
$\sin \lambda \sin \epsilon$	- 0.1461 8544	- 0.1444 5590
+ 445 β	+ 423	- 659
Sum	- 0.1461 8121	- 0.1444 6249
X (pages 31 and 47)	+ 0.9213 2922	+ 0.9230 0433
Y (" ")	- 0.3338 6853	- 0.3299 5287
Z (" ")	- 0.1448 0684	- 0.1431 0428

The necessary multiplications are done on a calculating machine. As a check against systematic error occasional values for the equinox of 1950.0 may be converted to the equinox of 1931.0 by means of the formulæ on page 754. In the present case the converted values are

$$X = + 0.9213 \ 2920 \quad Y = - 0.3338 \ 6853 \quad Z = - 0.1448 \ 0687$$

which agree as closely as can be expected with the values computed directly.

16—*Sun's Horizontal Parallax*
 Formula :—

$$8''.80 \div R$$

$$R \text{ (page 39)} \quad 0.9906$$

$$\text{Horizontal parallax (page 54)} \quad 8''.88$$

17—*Sun's Aberration*
 Formula :—

$$20''.47 \div R$$

$$R \text{ (page 39)} \quad 0.9906$$

$$\text{Aberration (page 54)} \quad 20''.66$$

18—*Precessional Constants*

The values of ϵ , p , m , n , π and π on page 54 are derived from the formulæ on page 757 by putting $T = 0.31$.

The formulæ used for the quantities ζ_0 , z and θ , for reduction from the equinox of 1950.0 to the mean equinox of other years are :—

$$\zeta_0 = 2304''.948 \ T + 0''.302 \ T^2 + 0''.0179 \ T^3$$

$$z = 2304''.948 \ T + 1''.093 \ T^2 + 0''.0179 \ T^3$$

$$\theta = 2004''.255 \ T - 0''.426 \ T^2 - 0''.0416 \ T^3$$

where T is measured from 1950.0 in units of 100 tropical years. For reduction to the equinox of 1950.0, ζ_0 must be replaced by $-z$, z by $-\zeta_0$ and θ by $-\theta$.

The calculation of ζ_0 for reduction from 1931.0 to 1950.0 is as follows :—

$$\begin{array}{rcl}
 -2304''.948 & \times & -0.19 & + & 437''.940 \\
 -1''.093 & \times & -0.19^2 & - & 0.039 \\
 -0.0179 & \times & -0.19^3 & + & 0.000 \\
 \text{Sum} = \zeta_0 \text{ (page 54)} & & & + & 437.901
 \end{array}$$

The quantity M for reduction from 1931.0 to 1950.0 is equal to $19 \times$ value of m at 1940.5, the point half-way between 1931.0 and 1950.0, i.e. $19 \times 3^s.07309$ or $58^s.389$. N is found similarly.

The formulæ for a , b and c are :—

For reduction from the equinox of t to that of 1950.0

$$\begin{aligned}
 a &= \bar{p} (1950 - t) \\
 b &= \bar{\pi} (1950 - t) \\
 c &= 180^\circ - \bar{\pi} + \frac{a}{2}
 \end{aligned}$$

and for reduction from the equinox of 1950.0 to that of t

$$\begin{aligned}
 a &= \bar{p} (t - 1950) \\
 b &= -\bar{\pi} (t - 1950) \\
 c &= 180^\circ - \bar{\pi} - \frac{a}{2}
 \end{aligned}$$

where \bar{p} , $\bar{\pi}$ and $\bar{\pi}$ are the values of p , π and π at the epoch half-way between 1950.0 and t .

19—Moon's Mean Equator

This illustration is for January 1.

Mean obliquity, beginning of year (page 54)	23°	26'	53''.74
— $0''.468 \times \tau$			0.00
— B (page 262)			+ 8.08
Sum = true obliquity = ϵ	23	27	01.82
Ω (page 55)	19	36.8	
N = nutation in longitude (page 7)			— 5.23

	Angle	sin	cos
ϵ	23° 27'.0	+ 0.39795	+ 0.91741
$\Omega + N$	19 36.7	+ 0.33565	+ 0.94199
I	1 32.1	+ 0.02679	+ 0.99964

From the formulæ on page 758

cos i = + 0.92712	i = 22° 00.5
sin Ω' = — 0.02399	Ω' = — 1 22.5
sin Δ = — 0.35642	Δ = 200 52.8

20—Moon's Longitude, Latitude and Horizontal Parallax

These are derived, for each noon and midnight, from Brown's *Tables of the Motion of the Moon*, which should be consulted for a description of the tables and their use.

21—Moon's Semi-diameter

Formula :— $s = 0''.079 + 0.272446 \pi$

Moon's H.P. (Brown's Tables) = π	= 3525''.161
0.272446 π	960.416
Constant	0.079
Sum = semi-diameter (page 58)	960.495

22—Moon's Right Ascension and Declination

The noon and midnight values of the longitude and latitude obtained from Brown's *Tables* are converted to right ascension and declination. The formulæ are

$$\begin{aligned}\cos \delta \cos \alpha &= \cos \beta \cos \lambda \\ \cos \delta \sin \alpha &= \cos \beta (\sin \lambda \cos \epsilon - \tan \beta \sin \epsilon) \\ \sin \delta &= \cos \beta (\sin \lambda \sin \epsilon + \tan \beta \cos \epsilon)\end{aligned}$$

so that

$$\tan \alpha = \frac{\sin \lambda \cos \epsilon - \tan \beta \sin \epsilon}{\cos \lambda}$$

or

$$\cot \alpha = \frac{\cos \lambda}{\sin \lambda \cos \epsilon - \tan \beta \sin \epsilon}$$

It is convenient to determine $\tan \alpha$ or $\cot \alpha$, whichever is numerically less than 1.

λ (Brown's <i>Tables</i>)	97° 02' 32".14	$\sin \lambda \cos \epsilon$	+ 0.910 4814
$\sin \lambda$	+ 0.992 4560	$-\tan \beta \sin \epsilon$	- 0.035 8214
$\cos \lambda$	- 0.122 6014	Sum	+ 0.874 6600
β (Brown's <i>Tables</i>)	+ 5° 08' 36".50	$\sin \lambda \sin \epsilon$	+ 0.394 9590
$\cos \beta$	+ 0.995 9733	$\tan \beta \cos \epsilon$	+ 0.082 5776
$\tan \beta$	+ 0.090 0124	Sum	+ 0.477 5366
ϵ (No. 3)	+ 23° 27' 02".82	$\cot \alpha$	- 0.140 1704
$\sin \epsilon$	+ 0.397 9612	α	06 ^h 31 ^m 55 ^s .005
$\cos \epsilon$	+ 0.917 4023	$\sin \delta$	+ 0.475 6137
		δ	+ 28° 23' 57".54

The functions $\sin \lambda$ and $\cos \lambda$ are taken from a corrected copy of Brandenburg's *Siebenstellige Trigonometrische Tafel*. A manuscript 7-figure table at interval 1" up to 6° is used for $\cos \beta$ and $\tan \beta$. Another 7-figure manuscript table of the natural values of the trigonometrical functions for every 1" enables α to be taken out directly in time and thus avoids a conversion from arc to time.

The interpolation of the half-daily values of the right ascension and declination to hourly values is done by the method described in Brown's *Tables*, Section I, Chapter VIII.

23—Moon's Phases

The computation of the First Quarter on February 25 is illustrated.

G.M.T.	Moon's longitude	Sun's apparent longitude	Excess of Moon's longitude	Δ'	Δ''
Feb. 25 ^d .0	57 14 31.3	335 25 37.2	81 48 54.1	5 51 46.8	
25.5	63 36 28.1	335 55 47.2	87 40 40.9	5 57 38.3	5 51.5
26.0	70 04 16.0	336 25 56.8	93 38 19.2	6 03 59.5	6 21.2
26.5	76 38 24.5	336 56 05.8	99 42 18.7		

The Sun's apparent longitude is obtained as described on page 803.

The time of the phase, or the time when the excess of the Moon's longitude is 90°, obviously falls between February 25^d.5 and 26^d.0. If then n is the interval (expressed as a fraction of 12 hours) from February 25^d.5 to this time

$$n\Delta' + E_0\Delta_0'' + E_1\Delta_1'' = 90^\circ - 87^\circ 40' 40''.9 = 8359''.1$$

where E_0 and E_1 are taken from Table XVII (page 727) with argument n .

It is not difficult to determine by trial two values of n differing by 0.01 which yield values of $n\Delta' + E_0\Delta_0'' + E_1\Delta_1''$ just less than and just greater than 8359".1.

$$\begin{array}{rcccccl} n & E_0 & E_1 & n\Delta' + E_0\Delta_0'' + E_1\Delta_1'' & \\ 0.39 & -0.0638 & -0.0551 & 8368".7 - 22".4 - 21".0 & = 8325".3 \\ & & & & \quad \quad \quad 214".2 \\ 0.40 & -0.0640 & -0.0560 & 8583.3 - 22.5 - 21.3 & = 8539.5 \end{array}$$

$$\text{Hence } n = 0.39 + \frac{8359.1 - 8325.3}{214.2} \times 0.01 = 0.39158$$

$$\text{First Quarter (page 163)} \quad 25^d 16^h 41^m.9$$

24—Moon's Perigee and Apogee

These occur at the times when the variation per hour of the Moon's parallax is zero. Using the notation of page 800, and if V_0 and V_1 are of opposite signs, the time of the phenomenon required, measured in hours from the time to which V_0 corresponds, is $12(n_0 + \Delta n)$, where

$$\begin{aligned} n_0 &= -\frac{V_0}{V'} \\ \Delta n &= \frac{B''(V_0'' + V_1'')}{2V'} \end{aligned}$$

B'' being taken from Table XVI (page 726) with argument n_0 .

Thus on January 6

	Var.	V'	V''
January 6 ^d .5	+ 0.069		+ .013
		- .304	
7 .0	- 0.235		+ .021
$n_0 = 69 \div 304$			+ 0.227
$\Delta n = \frac{-0.088 \times + 0.034}{2 \times -.304}$			+ 0.005
Sum = n			+ 0.232

$$\text{Hence time of perigee (page 163)} \quad 6^d.5 + 2^h.8 = 6^d 14^h.8$$

25—Ephemeris of Moon at Transit at Greenwich

The time of transit (pages 56-71) is first determined. The initial step is to find an integral hour of G.M.T. which does not differ by more than 40^m from the time required; this is readily done by the addition of 12^h or 13^h to the approximate time of previous transit. For the upper transit on February 28 it is found that the transit occurs in the neighbourhood of 21^h. The correction to this hour is

$$\frac{\text{R.A. of Moon at } 21^h - \text{sidereal time at } 21^h}{3609^s.86 - \Delta'a}$$

in hours, when the numerator is in seconds and where $\Delta'a$ is the hourly variation of the Moon's R.A. at the moment half-way between 21^h and the time of transit. In actual practice a fraction f_0 is determined from the above equation, using for $\Delta'a$ the difference between the Moon's R.A. at the hour selected and the hour before if the transit is earlier, or the hour after if the transit is later. To this a small correction, never exceeding 0.00002, is added from a small manuscript table based on the formula

$$\text{Correction} = \frac{f_0(f_0 - 1)\Delta''a}{2(3609.86 - \Delta'a)}$$

where $\Delta''a$ is the second difference of the Moon's R.A. standing opposite the hour selected in the Moon's hourly ephemeris. The addition of this correction to f_0 gives f , which is to be added to the approximate hour of transit.

G.M.T.	R.A. (page 86)	$\Delta'a$	$\Delta''a$	Dec. (page 86)	$\Delta'\delta$	$\Delta''\delta$
28 ^d 20 ^h	07 ^h 24 ^m 51 ^s .65			+27° 15' 12".9		
		+ 159 ^s .03			- 329 ^s .1	
28 21	07 27 30.68		- 0 ^s .05	+27 09 43.8		- 11 ^s .7

G.M.T.	H.P. (page 58)	$\Delta'\pi$	$\Delta''\pi$
28 ^d 12 ^h	59' 13".772		
		+ 27".628	
29 00	59 41.400		- 1".33

Sidereal Time at 0 ^h (page 8)	10 27 23 ^s .89
Sidereal equivalent of 21 ^h (page 710)	21 03 26.99
Sum = sidereal time at 21 ^h	07 30 50.88
Moon's R.A. at 21 ^h (page 86)	07 27 30.68
R.A. - sidereal time	- 200.20
Reciprocal* of (3609.86 - $\Delta'a$)	0.00028978
Product = f_0	- 0.05801
Correction	0.00000
Sum = f	- 0.05801
Time of transit = 21 ^h + f (page 58)	20 ^h .94199 = 20 ^h 56 ^m .5

* From a small manuscript table, with argument $\Delta'a$.

Although the time of transit is printed to the nearest 0^m.1 only, it is required to 0^h.00001 for the interpolations which follow.

R.A. at 21 ^h	07 27 30 ^s .88
$f \times \Delta'a = -0.05801 \times 159s.03$	- 9.225
$B'' \times \Delta''a = -0.027 \times -0s.05$	+ 0.001
Sum = R.A. of Moon's centre at transit	07 27 21.456

B'' is taken from Table XVI (page 726) with argument f .

Declination at 21 ^h	+ 27° 09' 43".8
$f \times \Delta'\delta = -0.05801 \times -329s.1$	+ 19.09
$B'' \times \Delta''\delta = -0.027 \times -11s.7$	+ 0.32
Sum = Dec. of Moon's centre at transit (page 166)	+ 27 10 03.2

Time of transit	20 ^h .94199
Interval from preceding 0 ^h or 12 ^h	8.94199
Interval expressed as a fraction of 12 ^h	0.74517

Horizontal parallax at 12 ^h	59' 13".772
Interval $\times \Delta'\pi = 0.74517 \times +27s.628$	+ 20.588
$B'' \times \Delta''\pi = -0.095 \times -1s.33$	+ 0.126
Sum = horizontal parallax at transit (page 166)	59 34.486
Semi-diameter in arc (see No. 21) (page 166)	16 13.93

B'' is taken from Table XVI (page 726) with argument 0.74517.

The semi-diameter in time, or the sidereal time of the semi-diameter passing the meridian is

$$\frac{\text{S.D. in arc} \times \sec \delta \times 3609.86}{15 (3609.86 - \Delta'a)}$$

in which the value of $\Delta'a$ is now the value at the time of transit. If a value S_0 is computed with the value of $\Delta'a$ previously used, the necessary correction is

$$\frac{S_0 (f \mp \frac{1}{2}) \Delta'a}{3609.86 - \Delta'a}$$

according as f is positive or negative. The correction may be taken, with sufficient accuracy, as 0^s.020 ($f \mp \frac{1}{2}$) $\Delta'a$, and is given by a small double entry table; it does

not exceed 0^s.005. Another manuscript table gives the factor $\frac{1}{18}$ 3609.86 sec δ , in this case 270.50.

S.D. in time $973.93 \times 0.00028978 \times 270.50$	^m 16.342
Correction	0.000
R.A. of Moon's centre	^h 07 27 21.456
R.A. of limb I (page 166)	07 26 05.114

The calculation of the variations per hour of longitude is illustrated on page 802.
The calculation of the Moon's illuminated limb and defective illumination from the formulæ on page 760 is illustrated for May 1.

R.A. of limb I (page 169)	^h 14 ^m 16 ^s 31		
S (page 169)	1 11		
R.A. of centre = α	14 17.7		
π (page 169)	60'		
Geocentric Dec. of centre (page 169) = δ	- 15° 58'		
Latitude (page 682) = ϕ	+ 51 29	sin	cos
$\phi - \delta$	+ 67 27	+ 0.92	
$\Delta\delta = - 60' \sin 67^\circ 27'$	- 55		
$\delta' = \delta + \Delta\delta$	- 16 53	- 0.290	+ 0.957
α_\odot (page 10, interpolated to 23 ^h 42 ^m)	02 ^h 32 ^m .8		
δ_\odot (page 10, interpolated to 23 ^h 42 ^m)	+ 15° 01'	+ 0.259	+ 0.966
s (page 169)	982"		
$\alpha - \alpha_\odot$	11 ^h 44 ^m .9	+ 0.066	- 0.998
$\sin \delta_\odot \cos \delta'$	+ 0.248		
$-\cos \delta_\odot \sin \delta' \cos (\alpha - \alpha_\odot)$	- 0.280		
Sum = $\sin \theta$	- 0.032		

Hence the southern limb is illuminated.

$\sin (\alpha - \alpha_\odot) \cos \delta_\odot$	0.064
$\frac{1}{2} S \times 0.064^2 =$ defective illumination in R.A. (page 169)	0 ^s .14
$\frac{1}{2} s \times 0.032^2 =$ defective illumination in Dec. (page 169)	0 ^s .50

26—Right Ascension, Declination and Distance of Planets

λ_0 = Sun's longitude, referred to mean equinox of date, not affected by aberration, as given by Newcomb's *Tables*

λ = Sun's longitude, referred to true equinox of date = λ_0 + nutation in longitude

β = Sun's latitude referred to ecliptic of date, as obtained from Newcomb's *Tables*

R = radius vector of Sun

l_0 = heliocentric longitude of planet, referred to mean equinox of date, as given by the tables mentioned on page 761

l = heliocentric longitude of planet, referred to true equinox of date = l_0 + nutation in longitude

b = heliocentric latitude of planet

r = radius vector of planet

ϵ = apparent obliquity

α = geocentric right ascension

δ = geocentric declination

Δ = geocentric distance

The formulæ at present in use are

$$\tan \psi = \frac{r \cos b \sin(l - \lambda)}{R + r \cos b \cos(l - \lambda)}$$

$$\text{Geocentric longitude} = \lambda + \psi$$

$$\text{Geocentric latitude} = \tan^{-1} \frac{r \sin b \sin \psi}{r \cos b \sin(l - \lambda)} + \frac{R\beta}{\Delta}$$

$$= \tan^{-1} \frac{r \sin b \cos \psi}{R + r \cos b \cos(l - \lambda)} + \frac{R\beta}{\Delta}$$

$$\text{Geocentric distance} = \Delta = r \cos b \sin(l - \lambda) \operatorname{cosec} \psi \sec(\text{geocentric lat.})$$

$$= \{R + r \cos b \cos(l - \lambda)\} \sec \psi \sec(\text{geocentric lat.})$$

The first of the alternative formulæ for latitude and distance are used when ψ is near 90° or 270° , and the second when it is near 0° or 180° .

The planetary aberration, or correction to the planet's position to allow for its motion during the time that light requires to reach the Earth from the planet, is introduced at this stage. Since light travels unit distance in $498^s.38$ (corresponding to a constant of aberration of $20''.47$) the necessary correction is

$$\frac{498.38 \Delta \times \text{motion in } 2^d}{60 \times 60 \times 24 \times 2} \\ = -0.0028841 \Delta \times \text{motion in } 2^d$$

The motion in 2^d is obtained by subtracting the uncorrected longitude (or latitude) on the day before that for which the calculation is being made from that on the day following.

Calling L and B the corrected geocentric longitude and latitude

$$\begin{aligned} \tan \theta &= \tan B \operatorname{cosec} L \\ \tan \alpha &= \tan L \sec \theta \cos (\theta + \epsilon) \\ \tan \delta &= \sin \alpha \tan (\theta + \epsilon) \end{aligned}$$

The above formulæ have been used in the past with logarithmic calculations, but, in view of the present availability of calculating machines, the following simpler procedure will be adopted in future.

$$\begin{aligned} X &= R \cos \lambda \\ Y &= R (\sin \lambda \cos \epsilon - 19.3 \beta) \\ Z &= R (\sin \lambda \sin \epsilon + 44.5 \beta) \end{aligned}$$

β being in seconds of arc, and the numerical coefficients in units of the seventh decimal.

$$\begin{aligned} x &= r \cos b \cos l \\ y &= r \cos b (\sin l \cos \epsilon - \tan b \sin \epsilon) \\ z &= r \cos b (\sin l \sin \epsilon + \tan b \cos \epsilon) \\ X + x &= \xi = \Delta \cos \alpha_0 \cos \delta_0 \\ Y + y &= \eta = \Delta \sin \alpha_0 \cos \delta_0 \\ Z + z &= \zeta = \Delta \sin \delta_0 \end{aligned}$$

which are solved thus:—

$$\begin{aligned} \Delta &= \sqrt{\xi^2 + \eta^2 + \zeta^2} \\ \tan \alpha_0 &= \frac{\eta}{\xi} \quad (\text{used if } \eta \text{ is less than } \xi) \\ \cot \alpha_0 &= \frac{\xi}{\eta} \quad (\text{used if } \xi \text{ is less than } \eta) \\ \sin \delta_0 &= \frac{\zeta}{\Delta} \\ \alpha &= \alpha_0 - 0.0028841 \Delta \times \text{motion of } \alpha_0 \text{ in } 2^d \\ \delta &= \delta_0 - 0.0028841 \Delta \times \text{motion of } \delta_0 \text{ in } 2^d \end{aligned}$$

It may be remarked that, since this process is to be applied to all the planets, the quantities $X, Y, Z, \sin \epsilon$ and $\cos \epsilon$ need be computed once only. The quantities $\sin \epsilon$ and $\cos \epsilon$ are also used in the conversion of the Moon's longitude and latitude to right ascension and declination.

For the outer planets the geocentric ephemeris is usually computed first at intervals of four days, and then interpolated. This is the maximum possible interval, as the Earth does not move in a purely elliptical orbit round the Sun, having in addition a motion in an orbit round the centre of gravity of the Earth and Moon, the point which moves round the Sun in accordance with Kepler's laws. The period of this subsidiary motion is the lunar tropical month of $27^d.322$, so that the motion in four days is 53° . Harmonic terms that move through more than one radian ($57^\circ.3$) in the interval between successive calculations would, if included, result in the failure of the quantities in which they are included to difference properly.

For Venus on February 28^d.0 the heliocentric co-ordinates from Newcomb's *Tables* are (N.A. for 1916, page 46A)

$$\begin{aligned} l_0 &= 217^\circ 04' 02''.55 \\ b &= +2^\circ 08' 13''.55 \\ \log r &= 9.85913626 \end{aligned}$$

The conversion to geocentric co-ordinates is as follows :—

λ_0 (No. 4)	338° 26' 54''.59	l_0	217° 04' 02''.55
Nutation (No. 12)	— 3''.81	Nutation (page 9)	— 3''.81
Sum = λ	338° 26' 50''.78	Sum = l	217° 03' 58''.74
$\sin \lambda$	— 0.367 3546	$\sin l$	— 0.602 7390
$\cos \lambda$	+ 0.930 0810	$\cos l$	— 0.797 9384
ϵ (No. 3)	23° 27' 02''.82	b	+ 2° 08' 13''.55
$\sin \epsilon$	+ 0.397 9612	$\cos b$	+ 0.999 3044
$\cos \epsilon$	+ 0.917 4023	$\tan b$	+ 0.037 3167
R (No. 6)	0.990 5982	r	0.722 9966
β (No. 5)	+ 0°.93	$r \cos b$	0.722 4937
$\sin \lambda \cos \epsilon$	— 0.337 0120	$\sin l \cos \epsilon$	— 0.552 9541
— 19.3 β	— 18	— $\tan b \sin \epsilon$	— 0.014 8506
Sum	— 0.337 0138	Sum	— 0.567 8047
$\sin \lambda \sin \epsilon$	— 0.146 1929	$\sin l \sin \epsilon$	— 0.239 8667
+ 44.5 β	+ 41	$\tan b \cos \epsilon$	+ 0.034 2344
Sum	— 0.146 1888	Sum	— 0.205 6323
X	+ 0.921 3366	Δ	0.870 9981
x	— 0.576 5055	$\log \Delta$ (page 193)	9.940 0172
Sum = ξ	+ 0.344 8311	$\cot \alpha_0$	— 0.463 4325
Y	— 0.333 8453	α_0	19° 39' 27''.489
y	— 0.410 2353	Aberration	— 1''.432
Sum = η	— 0.744 0806	α (page 193)	19° 39' 26''.057
Z	— 0.144 8144	$\sin \delta_0$	— 0.336 8347
z	— 0.148 5680	δ_0	— 19° 41' 02''.92
Sum = ζ	— 0.293 3824	Aberration	— 2''.03
		δ (page 193)	— 19° 41' 04''.95

27—Semi-diameter of Planets

$$\text{S.D.} = \frac{\text{S.D. at unit distance}}{\Delta}$$

$$\text{For Venus S.D. (page 193)} = \frac{8''.41}{0.8710} = 9''.66$$

28—Horizontal Parallax of Planets

$$\text{H.P.} = \frac{8''.80}{\Delta}$$

$$\text{For Venus H.P. (page 193)} = \frac{8''.80}{0.8710} = 10''.10$$

29—Planets at Transit at Greenwich

The method of preparing the ephemerides of planets at transit at Greenwich is similar in principle to that already described in No. 25 for the Moon at transit at Greenwich.

30—*Besselian Day Numbers*

$$A = \tau + \frac{\text{nutration in longitude (long-period terms only)}}{\psi}$$

$$= \tau + \text{nutration in longitude (0.0198528 - 0.0000020 } T)$$

Nutration in longitude (No. 12)	- 3".811
τ (No. 1)	0.15792
$0.0198522 \times - 3.811$	- 0.07566
Sum = A (page 263)	+ 0.08226

From the formula on page 763 for B , and the values of the angles in No. 12

- 9".210 cos 16°.542	- 8".829
+ 0.090 cos 33°.08	+ 0.075
- 0.551 cos 313°.72	- 0.381
- 0.022 cos 8°.82	- 0.022
+ 0.009 cos 258°.62	- 0.002
+ 0.007 cos 297°.18	+ 0.003
Sum = B (page 263)	- 9.156

$$C = - 20''.47 \cos \epsilon \cos \odot = - 18''.780 \cos \odot$$

$$D = - 20''.47 \sin \odot$$

Sun's true longitude from true equinox = longitude, mean

$$\text{equinox of date} + \text{nutration (No. 4)} = \odot \quad 338^\circ 26' 51''$$

$$C = - 18''.78 \times + 0.93008 \text{ (page 263)} \quad - 17''.467$$

$$D = - 20''.47 \times - 0.36735 \text{ (page 263)} \quad + 7''.520$$

Actually the printed values of C and D were obtained by interpolation between the values for the years 1915 and 1935, so that planetary perturbations are thereby ignored. It will be noted that the formulæ assume undisturbed elliptic motion.

31—*Independent Day Numbers*

$$f = mA + E$$

3.07291 (page 54) $\times + 0.08226$ (No. 30)	+ 0.2528
$E = 0.000157 \times - 3.81$	- 0.0006
Sum = f (page 272)	+ 0.2522

$$g \sin G = B$$

$$g \cos G = n''A$$

B (No. 30)	- 9.156
$n''A = 20.0442 \times + 0.08226$	+ 1.649
cot G	- 0.1801
G (page 272)	18 ^h 40 ^m .8
cosec G	- 1.0161
$B \text{ cosec } G = g$ (page 272)	9''.30

$$\begin{aligned} h \sin H &= C & i &= C \tan \epsilon \\ h \cos H &= D & &= 0.4337 C \end{aligned}$$

C (No. 30)	- 17.467
D (No. 30)	+ 7.520
cot H	- 0.4305
H (page 272)	19 ^h 33 ^m .2
cosec H	- 1.0887
$C \text{ cosec } H = h$ (page 272)	19''.02
$i = 0.4337 C$ (page 272)	- 7''.58

32—*Differential Precession and Nutation*

For reduction to 1931.0

$$\begin{array}{ll} g & j \\ 0.00 & 0.00 \end{array} \quad \begin{array}{l} j = g \sin 1^m = 0.00436 g \\ J = G - 6^h \end{array}$$

 j is taken from the critical table on the left.

For reduction to 1950.0 the formulæ on page 766 become, for the year 1931

$$\begin{array}{ll} 1.14 & 0.01 \\ 3.43 & 0.02 \\ 5.72 & 0.03 \\ 8.02 & 0.04 \\ 10.31 & 0.05 \\ 12.60 & 0.06 \\ 14.89 & 0.07 \\ 17.18 & 0.08 \\ 19.48 & \end{array} \quad \begin{array}{l} j \sin J_0 = 1.6617 - 0.0875 A \\ j \cos J_0 = 0.00436 B \\ J = J_0 - 29^s \end{array}$$

Since $j \cos J_0$ is very small in comparison with $j \sin J_0$

$$j = j \sin J_0 + \frac{(j \cos J_0)^2}{2j \sin J_0}$$

For February 28^d.0

$$\begin{array}{ll} j \sin J_0 & 1.6545 \\ j \cos J_0 & - 0.0399 \\ \cot J_0 & - 0.0241 \\ J_0 & 6^h 05^m 32^s \\ \text{Correction} & - 29 \\ J \text{ (page 290)} & 6 \quad 05 \quad 03 \\ (j \cos J_0)^2 \div 2j \sin J_0 & 0.0005 \\ j \text{ (page 290)} & 1.6550 \end{array}$$

33—*Apparent Places of Stars*

This calculation has already been illustrated in connection with the explanation of Besselian and independent day numbers on pages 762-766. In computing ephemerides of the same star over a long period of years, advantage is taken of the fact that the aberration virtually repeats itself every four years.

34—*Elements of Occultations*

The star chosen for illustration is the same as that forming the example on page 561, namely 415 B Tauri, occulted on January 31.

$$\begin{array}{ll} \alpha_* \text{ 1931.0 (page 525)} & 05^h 56^m 40.41^s \\ \Delta \alpha \text{ (page 530)} & +1.18 \\ \alpha_* & 05^h 56^m 41.59^s \\ \\ \delta_* \text{ 1931.0 (page 525)} & +27^\circ 34' 13.3'' \\ \Delta \delta \text{ (page 530)} & +9.6'' \\ \delta_* & +27^\circ 34' 22.9'' \\ \text{Apparent declination of star (page 530)} & +27^\circ 34' 4'' \\ \\ \alpha_\alpha \text{ January 31^d or^h (page 79)} & 05^h 56^m 54.55^s \\ \Delta \alpha_\alpha & 2.668 \\ \alpha_\alpha - \alpha_* & 12.96 \end{array}$$

Hence time of conjunction	$01^h - \frac{12.96}{2.668} = 00^h 55^m.14$
Correction for error in Moon's tabular position	-0.21
T_0 (page 530)	00 54.9
Greenwich sidereal time at $00^h 55^m.14$	09 32.30
α_*	05 56.70
Difference	+3 35.60
Correction	- 0.21
H (page 530)	+3 35.4
δ_c interpolated to $00^h 55^m.1$ (page 79)	+28 15 52.6
δ_*	+27 34 22.9
Difference	+ 41 29.7
Moon's parallax π at time of conjunction (page 57)	59 04.6
Y (page 530)	$+ \frac{2489.7}{3544.6} = +0.7024$
$\cos \delta_c$	+0.88077
$\Delta \alpha_c$ at conjunction	28.6671
x' (page 530)	$+ \frac{900 \times 0.88077 \times 2.6671}{3544.6} = +0.5964$
$\Delta \delta_c$ at conjunction	+1".147
y' (page 530)	$+ \frac{60 \times 1.147}{3544.6} = +0.0194$

For the limiting parallels

$\tan N$	+ 30.74	$\cos \delta$	0.8864
$\sin N$	+ 0.9995	$\sin \beta$	0.8860
$y \sin N$	+ 0.7020	N	88° 08'
$\cos \gamma_1$	+ 0.9745	γ_2	63 34
$\cos \gamma_2$	+ 0.4295	$N - \gamma_2$	23 34
ϕ_1	+ 90°	$\sin (N - \gamma_2)$	+0.3998
ϕ_2	+ 20° 45'	$\sin \phi_2$	+0.3544

In printing ϕ_2 the minutes are neglected.

35—Prediction of Occultations

The prediction is for the disappearance of 415 B Tauri at Edinburgh on January 31.

Co-ordinates of Edinburgh (pages 682-683)

$$\lambda + 00^h 12^m.7 \quad \rho \sin \phi' + 0.8247 \quad \rho \cos \phi' + 0.5616$$

Elements (page 530)

$$\begin{array}{ll} Y + 0.7024 & H + 03^h 35^m.5 \\ x' + 0.5964 & T_0 \quad 00 \quad 54.9 \\ y' + 0.0194 & \delta + 27^\circ 34'.4 \end{array}$$

Preliminary time T or $17^m.5$

$T - T_0 = t$	$+ 0^h 22^m.6$	fx'	$- 0.145$
	$= + 0.377$	gy'	$+ 0.002$
$H - \lambda + t_s = h$	$+ 3 45.5$	$- .2625 a_0$	$+ 0.013$
		$\text{Sum} = kn \cos \psi$	$- 0.130$
$x't = x$	$+ 0.225$	$J = + \frac{60^s \sin 1''}{kn \cos \psi}$	$+ 8.1$
$\rho \cos \phi' \sin h = \xi$	$+ 0.468$		
$x - \xi = f$	$- 0.243$		
$\rho \cos \phi' \cos h = Q$	$+ 0.311$	fQ	$- 0.076$
$\rho \sin \phi' \cos \delta = \eta_1$	$+ 0.731$	$g\xi \sin \delta$	$+ 0.026$
		$\text{Sum} = a_0$	$- 0.050$
$Y - \eta_1$	$- 0.029$	$Ja_0 = a$	$- 0.4$
$Q \sin \delta$	$+ 0.144$		
$y't$	$+ 0.007$	fp	$- 0.168$
$\text{Sum} = g$	$+ 0.122$	$- gq \sin \delta$	$- 0.026$
		$- gr$	$- 0.061$
$f^2 + g^2$	0.0739	$\text{Sum} = b_0$	$- 0.255$
$P = \tan^{-1} \frac{-0.243}{+0.122}$	117°	$Jb_0 = b$	$- 2.1$
Correction to assumed time		$+ \frac{30(f^2 + g^2 - k^2)}{kn \cos \psi}$	$= - 0^m.1$
Corrected time of disappearance			$01^h 17^m.4$

36—*Ephemeris for Physical Observations of the Sun*

The formulæ are given on page 776.

Sun's apparent longitude (No. 4)	$338^\circ 26' 30''$
True obliquity (No. 3)	$23 27 03$
λ (page 39)	$338^\circ.712$
$\lambda - 75^\circ.063$	263.649
J.D. (page 2)	2425400.5
$\tan x = -0.43379 \times +0.93004$	-0.40344
$\tan y = -0.12722 \times -0.11062$	$+0.01407$
$\sin B_0 = +0.12620 \times -0.99386$	-0.12543
$\cot L = +1.00806 \times +0.11130$	$+0.11220$
x	$- 21.971$
y	$+ 0.806$
$P = x + y$ (page 568)	$- 21.165$
B_0 (page 568)	$- 7.205$
L	263.598
Constant	112.766
$14^\circ.18439716 \times 3600$	303.830
$\text{Sum} = L_0$ (page 568)	320.194

37—*Ephemeris for Physical Observations of the Moon*

The necessary formulæ are given on pages 779 and 782.

λ (pages 58 and 714)	97.042
$\Omega + \text{nutations}$ (pages 55 and 9) = Ω_n	16.541
$\lambda - \Omega_n$	80.501
B (page 780)	-1.514
β (pages 58 and 714)	$+5.143$
$b' = B - \beta$	-6.657

A (page 780)				+ 0.0044
λ (above)				97.042
μ (page 780)				+ 0.003
Ab'				- 0.029
$-C$ (page 55)				-104.420
Sum = l'				- 7.404
Δ (page 55)				197.618
$l' + \Delta + C - \Omega_n$				278.093
i (page 55)				21 59.0
δ (page 86)				+28 24.0
$\sin i$				+0.37434
$\cos (l' + \Delta + C - \Omega_n)$				+0.14078
$\sec \delta$				+1.13682
$\sin C'$				+0.05991
α (page 86) in arc				97 58.8
Ω' (page 55)				- 1 10.0
$\alpha - \Omega'$				99 08.8
$\cos (\alpha - \Omega')$				-0.15896
$\sec b'$				+1.00678
$\sin C'$				+0.05991
C'				+ 3.435
Γ' (page 55)	162.2			
Ω (page 55)	16.5			
$\Gamma' - \Omega$	145.7		\sin	\cos
$2 (\Gamma' - \Omega)$	291.4		+0.56	-0.83
C (page 55)	104.4		-0.93	
$C - \Omega$	87.9		+1.00	+0.04
$C - \Gamma' = g$	302.2		-0.85	
$g' (= L - \pi \text{ from No. 12})$	55.1		+0.82	
l'_\bullet	-7.4		-0.13	
b'	-6.7		-0.11	
M				+0.019.
N				-0.016
b'' (page 573)				+0.021
C''				+0.014
+ 0.003 $\sin g$				-0.003
- 0.016 $\sin g'$				-0.013
- 0.005 $\sin 2 (\Gamma' - \Omega)$				+0.005
$C'' \sin b'$				-0.002
Sum = l'' (page 573)				-0.013
Hence				
l (page 573)				-7.417
b (")				-6.636
C (")				3.449
For the Sun's selenographic co-ordinates				
λ_\odot (No. 4)				338.447
λ (pages 58 and 714)				97.042
$\lambda_\odot - \lambda$				241.405
π (page 58)				58.8
R (page 39)				0.991

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β (page 58)	+5°14
$F_0 = \frac{8.80}{60 \times 58.8 \times 0.991}$	0.00252
F_1	57.1
$\sin(\lambda_\odot - \lambda)$	-0.875
$F_0 F_1 \sin(\lambda_\odot - \lambda)$	-0.126
λ_H	158.321
δ_n	16.541
$\lambda_H - \delta_n$	141.78
B (page 781)	-0.950
$\beta_H = F_0 \beta$	+0.013
$b'_\odot = B - \beta_H$	-0.963
λ_H	158.321
μ (page 781)	-0.007
$Ab'_\odot = -0.0210 \times -0.96$	+0.020
$-C$	-104.420
$\text{Sum} = l'_\odot$	53.914
l''_\odot , first three terms, as on page 821	-0.011
$(M \sin l'_\odot - N \cos l'_\odot) \tan b'_\odot$	0.000
$\text{Sum} = l''_\odot$	53.903
Colongitude = $90^\circ - l_\odot$ (page 573)	36.097
b''_\odot	-0.002
$b_\odot = b'_\odot + b''_\odot$ (page 573)	-0.965

For the position angle of the terminator and the fraction illuminated.

a_\odot	$\begin{smallmatrix} h & m & s \\ 22 & 40 & 18 \end{smallmatrix}$	c_\odot	36°10
a	$\begin{smallmatrix} 06 & 31 & 55 \end{smallmatrix}$	l	-7.42
$a_\odot - a$	$\begin{smallmatrix} 16 & 08 & 23 \end{smallmatrix}$	$c_\odot + l$	28.68
δ_\odot	-8° 24' 5	b_\odot	-0° 96
$\log \tan \delta_\odot$	9.1697n	$\log \tan b_\odot$	8.2242n
$\log \cos(a_\odot - a)$	9.6702n	$\log \sin(c_\odot + l)$	9.6811
$\text{Diff.} = \log \tan N$	9.4995	$\text{Diff.} = \log \tan M$	8.5431n
δ	+28° 24' 0	M	-2.00
N	+17 31.7	b	-6.64
$\delta - N$	+10 52.3	$M - b$	+4.64
$\log \cot(a_\odot - a)$	9.7239	$\log \tan(c_\odot + l)$	9.7380
$\log \sin(\delta - N)$	9.2756	$\log \sin(M - b)$	8.9079
$\log \sec N$	0.0207	$\log \sec M$	0.0003
$\text{Sum} = \log \tan T$	9.0202	$\text{Sum} = \log \tan(T - C)$	8.6462
T (page 573)	5° 98	$T - C$	+2° 54
$\log \cos(a_\odot - a)$	9.6702n	C (page 573)	3.45
$\log \cos \delta_\odot$	9.9953	T (page 573)	5.99
$\log \cos(\delta - N)$	9.9921	λ_\odot	338° 26' 8
$\log \sec N$	0.0207	λ	97 02.5
$\text{Sum} = \log f$	9.6783n	$\lambda - \lambda_\odot$	118 35.7
f^*	-0.476	F (page 573)	0.739
F (page 573)	0.738		

*f is taken to the nearest even value of the third decimal.

38—Illuminated Disc of Mercury and Venus

The illustration is for Venus on January 1, the formulæ being given on page 783.

α (page 192)	$\begin{smallmatrix} h & m & s \\ 15 & 47 & 38 \end{smallmatrix}$	$\log \cot \delta_{\odot}$	0.3700n
α_{\odot} (page 6)	$\begin{smallmatrix} 18 & 41 & 50 \end{smallmatrix}$	$\log \cos (\alpha - \alpha_{\odot})$	9.8602
$\alpha - \alpha_{\odot}$	$-2 \ 54 \ 12$	Sum = $\log \tan M$	0.2302n
δ_{\odot} (page 6)	$\begin{smallmatrix} 0 & 06 & 1 \end{smallmatrix}$	$\log \cos (M + \delta)$	9.4050n
δ (page 192)	$-15 \ 45 \cdot 5$	$\log \cot (\alpha - \alpha_{\odot})$	0.0220n
M	$120 \ 28 \cdot 8$	$\log \operatorname{cosec} M$	0.0646
$M + \delta$	$104 \ 43 \cdot 3$	Sum = $\tan \theta$	9.4916
θ	$197^{\circ} 23$	$\log \cos \delta_{\odot}$	9.9637
D	$138 \cdot 44$	$\log \sin (\alpha - \alpha_{\odot})$	9.8382n
S	$23 \cdot 67$	$\log \sec \theta$	0.0199n
i	$114 \cdot 77$	Sum = $\log \sin D$	9.8218
k	$0 \cdot 2906$	$\log \Delta$ (page 192)	9.6383
		$\operatorname{colog} r$	0.1436
		Sum = $\log \sin S$	9.6037

$\log r$ is taken from the Appendix to the NAUTICAL ALMANAC for 1916. If i is not too near 90° $\log \Delta$ is replaced by $\log R$ (page 6) and then $\sin S$ becomes $\sin i$, the line $\log \sin D$ being omitted.

For the brilliancy of the disc and the stellar magnitude

$\log r$	9.8564	$\log r\Delta$	-0.5053
$\log \Delta$	9.6383		
$\log r\Delta$	9.4947	Constant	-4.00
		$5 \times \log r\Delta$	-2.53
$\operatorname{colog} r\Delta$ (added twice)	0.5053	0.01322×114.8	+1.52
$\log \text{constant}$	1.8496	$0.0000004247 \times 114.8^3$	+0.64
$\log k$	9.4633	Sum = magnitude	-4.37
$\log L$	2.3235		
L	210.6		

39—Ephemeris for Physical Observations of Mars

The formulæ required are those numbered 1-18 on pages 786-788.

α_0 , beginning of year	$\begin{smallmatrix} h & m & s \\ 21 & 10 & 40 \cdot 7 \end{smallmatrix}$	δ_0 , beginning of year	$+54^{\circ} 591$
+ 1.81 A	+0.1	+ 0.0041 A	+ 0.000
+ 0.070 B	-0.6	+ 0.0002 B	- 0.002
- 0.24 τ	0.0	- 0.0006 τ	0.000
Sum = α_0	21 10 40.2	Sum = δ_0	+54.589
α	08 03 22.9	δ	+24.457
$\alpha_0 - \alpha$	13 07 17.3		
$\log \cot \delta_0$	9.85184	$\log \cot \delta$	0.34216
$\log \cos (\alpha_0 - \alpha)$	9.98101n	$\log \cos (\alpha_0 - \alpha)$	9.98101n
Sum = $\log \tan H$	9.83285n	Sum = $\log \tan K$	0.32317n
H	$-34^{\circ} 237$	K	$-64^{\circ} 585$
$H + \delta$	$-9 \ 780$	$K + \delta_0$	$-9 \ 996$
$\log \tan (\alpha_0 - \alpha)$	9.48049	$\log \tan (\alpha_0 - \alpha)$	9.48049
$\log \sin H$	9.75022n	$\log \sin K$	9.95580n
$\log \sec (H + \delta)$	0.00636	$\log \sec (K + \delta_0)$	0.00665
Sum = $\log \tan P$	9.23707n	Sum = $\log \tan R$	9.44294n
$\log \{-\tan (H + \delta)\}$	9.23646	$\log \tan (K + \delta_0)$	9.24614n
$\log \cos P$	9.99363	$\log \cos R$	9.98392n
Sum = $\log \tan D_{\oplus}$	9.23009	Sum = $\log \tan D_{\oplus}$	9.23006

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P	350°207	R	164°502
D_{\oplus}	+9°640	X	44°078
		$A_{\oplus} + 180^{\circ}$	208°580
l	140°724	$2(l - \Omega)$	183°
Ω	49°026	$\sin 2(l - \Omega)$	-0°05
$l - \Omega$	91°698	$\log \tan \odot_s$	0°11881
$0^{\circ} \cdot 015 \sin 2(l - \Omega)$	-0°001	$\log \cos Z$	9°96080
$-Y$	-38°955	$\text{Sum} = \log \tan A_{\odot}$	0°07961
\odot_s	52°742		
$\log \sin \odot_s$	9°90087	$A_{\odot} + 180^{\circ}$	230°222
$\log \sin Z$	9°60896	$A_{\oplus} + 180^{\circ}$	208°580
$\log \sin D_{\odot}$	9°50983	$A_{\odot} - A_{\oplus}$	21°642
D_{\odot}	+18°873		
α	08 ^h 03 ^m 22 ^s 9	$\log \cot \delta_{\odot}$	0°83028 n
α_{\odot}	22 40 18°4	$\log \cos (\alpha - \alpha_{\odot})$	9°88908 n
$\alpha - \alpha_{\odot}$	09 23 04°5	$\text{Sum} = \log \tan M$	0°71936
δ_{\odot}	- 8 24°50	$\log \{ - \tan (\alpha - \alpha_{\odot}) \}$	9°91195
δ	+ 24 27°40	$\log \sin M$	9°99223
M	+ 79 11°78	$\log \sec (M + \delta)$	0°62702 n
$M + \delta$	+103 39°18	$\text{Sum} = \log \tan Q$	0°53120 n
Q	106°400	$\log R$	9°99590
i	22°893	$\log \cos \delta_{\odot}$	9°99531
k	0°9606	$\log \sin (\alpha - \alpha_{\odot})$	9°80103
Light time	6 ^m 47	$\log \operatorname{cosec} Q$	0°01804
Diameter	12" 01	$\operatorname{colog} r$	9°77968
q	0" 47	$\text{Sum} = \log \sin i$	9°58996
$\log \text{constant}$	0°91957	$\log \text{constant}$	0°97128
$\log \Delta$	9°89160	$\log \Delta$	9°89160
$\text{Sum} = \log \text{light time}$	0°81117	$\text{Diff.} = \log \text{diameter}$	1°07968
$\log r$	0°2203	$\log \text{constant}$	0°30640
$\log \Delta$	9°8916	$\log \Delta$	9°89160
$\log r\Delta$	0°1119	$\text{Sum} = \log \text{rotation}$	0°19800
$5 \log r\Delta$	+0°56	$V + 180^{\circ}$	367°029
Constant	-1°30	$A_{\oplus} + 180^{\circ}$	208°580
$0^{\circ} \cdot 01486 i$	+0°34	Rotation	1°578
$\text{Sum} = \text{magnitude}$	-0°40	Longitude of C.M.	156°871

Longitude of C.M. February 27^d 0 165°87 351°00
28°0 156°87 350°99
29°0 147°86

$$\begin{aligned} \text{Hence transit of zero meridian} &= 28^{\text{d}} \cdot 0 + \frac{203 \cdot 13}{350 \cdot 99} \\ &= 28^{\text{d}} \cdot 57874 = 28^{\text{d}} \ 13^{\text{h}} \ 53^{\text{m}} \cdot 4 \end{aligned}$$

40—Rings of Saturn

The illustration is for January 1. The value of $\log \Delta$ (page 216) is 1.04195, and of Δ 11.014. Hence

$$a = 375''.35 \div 11.014 = 34''.08$$

$$b = a \sin B = 34''.08 \times 0.4206 = 14''.33$$

From the values of m and n on page 54, of A and B on page 262, τ on page 271, and the variations on page 216

α (page 216)	18 59 24.03	δ (page 216)	- 22 23 34.5
$(A - \tau) (m + n \sin \alpha \tan \delta)$	- 0.38	$(A - \tau) n \cos \alpha$	0.0
$1.7 B \cos \alpha \tan \delta$	0.00	$- B \sin \alpha$	- 8.1
$- 0.1384 \times 11.014 \times + 1.5.273$	- 1.94	$- 0.1384 \times 11.014 \times + 1''.63$	- 2.5
Corrected α	18 59 26.35	Corrected δ	- 22 23 23.9

The values of l and b , from page 56A of the NAUTICAL ALMANAC for 1915, are

$$l = 284^\circ 07' 05''.1 \quad b = + 0^\circ 23' 16''.2$$

From the formulæ on page 792

α	284.8598	l	284.1181
N (page 792)	127.6670	Ω (page 792)	168.5318
$\alpha - N$	157.1928	$l - \Omega$	115.5863
$\log \sin (\alpha - N)$	9.588419	$\log \sin (l - \Omega)$	9.955176
$\log \tan J$	9.075890	$\log \tan i$	9.727280
Sum = $\log \tan G$	8.664309	Sum = $\log \tan G'$	9.682456
G	+ 2.6432	G'	+ 25.7036
δ	- 22.3900	b	+ 0.3878
$G - \delta$	+ 25.0332	$G' - b$	+ 25.3158
$\log \cos (\alpha - N)$	9.964643 n	$\log \cos (l - \Omega)$	9.635353 n
$\log \tan J$	9.075890	$\log \tan i$	9.727280
$\log \cos G$	9.999538	$\log \cos G'$	9.954749
$\log \sec (G - \delta)$	0.042842	$\log \sec (G' - b)$	0.043848
- Sum = $\log \tan P$	9.082913	- Sum = $\log \tan P'$	9.361230
$\log \tan (G - \delta)$	9.669329	$\log \tan (G' - b)$	9.674893
$\log \cos P$	9.996842	$\log \cos P'$	9.988831
Sum = $\log \tan B$	9.666171	Sum = $\log \tan B'$	9.663724
$\log \tan \delta$	9.614861 n	$\log \tan b$	7.8305
$\log \sin (\alpha - N)$	9.588419	$\log \sin (l - \Omega)$	9.9552
Diff. = $\log \tan H$	0.026442 n	Diff. = $\log \tan H'$	7.8753
H	- 46.7431	H'	+ 0.4299
J (page 792)	6.7916	i (page 792)	28.0879
$H - J$	- 53.5347	$H' - i$	- 27.6580
$\log \cos (H - J)$	9.774032	$\log \cos (H' - i)$	9.947303
$\log \tan (\alpha - N)$	9.623775 n	$\log \tan (l - \Omega)$	0.319823 n
$\log \sec H$	0.164138	$\log \sec H'$	0.000012
Sum = $\log \tan U$	9.561945 n	Sum = $\log \tan U'$	0.267138 n
$\log \tan (H - J)$	0.131341 n	$\log \tan (H' - i)$	9.719395 n
$\log \sin U$	9.534828	$\log \sin U'$	9.944329
- Sum = $\log \tan B$	9.666169	- Sum = $\log \tan B'$	9.663724

DERIVATION, 1931.

P	+ 6° 9013	P'	+ 12° 9384
B	+ 24° 8738	B'	+ 24° 7509
U	159° 9627	U'	118° 3951

These values agree perfectly with those on page 618, and with those in the *Berliner Jahrbuch*.

For the magnitude

U'	118° 24'	Constant	- 8.68
ω	41 59	$5 \log r \Delta$	+ 10.22
U	159 58	+ 0.044 \times 0.4	+ 0.02
$U' + \omega - U$	25	- 2.60 \times 0.421	- 1.09
$\log r$	1.0014	+ 1.25 \times 0.421	+ 0.22
$\log \Delta$	1.0419	Sum = magnitude	+ 0.69
$\log r \Delta$	2.0433		

41—Sunrise, Sunset and Twilight

Let

δ = declination of Sun, interpolated to the time of the phenomenon

E.T. = equation of time, interpolated to the time of the phenomenon

z = zenith distance of Sun's centre

h = Sun's hour angle at the time of the phenomenon

ϕ = latitude

Then

$$\cos h = -\tan \phi \tan \delta + \cos z \sec \phi \sec \delta$$

$$\text{G.M.T.} = 12^{\text{h}} - \text{E.T.} \mp h$$

the upper sign being used for morning phenomena and the lower sign for evening phenomena.

In preparing a continuous table the approximate values of the time of the phenomena, to which δ and E.T. must be interpolated, are readily inferred.

The example is for latitude + 52° on February 28.

	Morning twilight	Sunrise	Sunset	Evening twilight
δ (page 8)	-8° 20'	-8° 18'	-8° 18'	-8° 06'
$\tan \delta$	-0.1465	-0.1459	-0.1429	-0.1423
$\sec \delta$	+1.0107	+1.0106	+1.0101	+1.0100
$-\tan 52^\circ \tan \delta$	+0.1875	+0.1867	+0.1829	+0.1821
$\cos z \sec 52^\circ \sec \delta$	-0.5073	-0.0239	-0.0238	-0.5069
$\cos h$	-0.3198	+0.1628	+0.1591	-0.3248
h	$^{\text{h}} \quad ^{\text{m}}$ 7 14.6	$^{\text{h}} \quad ^{\text{m}}$ 5 22.5	$^{\text{h}} \quad ^{\text{m}}$ 5 23.4	$^{\text{h}} \quad ^{\text{m}}$ 7 15.8
$12^{\text{h}} - \text{E.T.}$ (page 8)	12 12.9	12 12.9	12 12.8	12 12.8
Time (pages 640-641)	04 58.3	06 50.4	17 36.2	19 28.6

The Sun's declination at 0^h on February 28 is - 8° 24'. The "corresponding date" (page 658) when the declination is most nearly + 8° 24' is September 2, when it is + 8° 22' at 0^h. The correction is found as follows:—

Equation of time, September 2	- 0.0
Equation of time, February 28	- 12.9
Difference = correction	+ 12.9

42—Moonrise and Moonset

The Moon's hour angle is computed as for sunrise and sunset, corrected to mean time and for the Moon's motion in right ascension, and then applied to the time of meridian passage. The correction to the computed hour angle is equal to its value in hours multiplied by the variation per hour of the Moon's time of meridian passage at the moment half-way between meridian passage and the phenomenon concerned. This correction always increases the hour angle numerically.

For latitude $+52^\circ$ on February 28

	Moonrise	Moonset
Approximate time	12 ^h	05 ^h
π (page 58)	59'	59'
z	89° 51'	89° 51'
δ (page 86)	+27° 52'	+28° 14'
$\tan \delta$	+0.5287	+0.5369
$\sec \delta$	+1.1312	+1.1350
$-\tan 52^\circ \tan \delta$	-0.6767	-0.6872
$\cos z \sec 52^\circ \sec \delta$	+0.0048	+0.0048
$\cos h$	-0.6719	-0.6824
h	8 48 ^m .9	8 52 ^m .1
Correction (page 58)	22.8	22.9
Meridian passage (page 58)	20 56.5	19 54.4*
Time (pages 662-663)	11 44.8	05 09.4

In actual practice h is determined from special tables based on the formula illustrated.

43—Reduction from 1950.0 to True Equinox of Date

The formulæ are given on page 798.

M (page 54)	-58 ^s .39	N' (page 54)	-6 ^s .347
f_0 (page 272)	+ 0.25	$\frac{1}{2}A$ (page 263)	+0.027
Sum = f (page 725)	-58.14	Sum = $g_0 \cos G_0$	-6.320
		$\frac{1}{2}B$ (page 263)	-0.152
G_0	12 05 32 ^s	$\tan G_0$	+0.0241
$1^s.5 \times 19$	29	$(g \sin G_0)^* \div 2g \cos G_0$	-0.002
Diff. = G (page 725)	12 05 03	g (page 725)	6.322

* On February 27.

APPENDIX.

TABLES FOR INTERPOLATION TO TENTHS AND FIFTHS BY THE
END-FIGURE PROCESS.

A method of interpolation to tenths and fifths, which is in use in the NAUTICAL ALMANAC Office, has been fully described in a paper* read before the Royal Astronomical Society. This appendix gives the necessary tables together with a description and illustration of their use, and the reader is referred to the paper cited for a comparison with other methods, and an account of the application of mechanical calculators to the process.

The notation employed, and the scheme of differences involved, are as follows :—

Function	Differences							
	1st	2nd	3rd	4th	5th	6th	7th	8th
f_0		Δ_0''		Δ_0^{iv}		Δ_0^{vi}		Δ_0^{viii}
	Δ_1'		Δ_1'''		Δ_1^v		Δ_1^{vii}	
f_1		Δ_1''		Δ_1^{iv}		Δ_1^{vi}		Δ_1^{viii}

For convenience the subscript $\frac{1}{2}$ will be omitted, as this cannot cause any confusion. The interpolation formula used is Bessel's :—

$$\begin{aligned}
 f_n = f_0 &+ n \Delta' + \frac{n(n-1)}{2.2!} (\Delta_0'' + \Delta_1'') + \frac{n(n-1)(n-\frac{1}{2})}{3!} \Delta'' \\
 &+ \frac{(n+1)(n)(n-1)(n-2)}{2.4!} (\Delta_0^{iv} + \Delta_1^{iv}) \\
 &+ \frac{(n+1)(n)(n-1)(n-2)(n-\frac{1}{2})}{5!} \Delta^v \\
 &+ \frac{(n+2)(n+1)(n)(n-1)(n-2)(n-3)}{2.6!} (\Delta_0^{vi} + \Delta_1^{vi}) + \text{etc.}
 \end{aligned}$$

The values of the coefficients for $n = \cdot 1, \cdot 2, \dots$ are shown in Table A. Those up to and including Δ^v are exact, while the remainder are rounded, except those for fifths in $\Delta_0^{vi} + \Delta_1^{vi}$.

TABLE A—Coefficients of Bessel's Formula.

Δ'	$\Delta_0'' + \Delta_1''$	Δ'''	$\Delta_0^{iv} + \Delta_1^{iv}$	Δ^v	$\Delta_0^{vi} + \Delta_1^{vi}$	Δ^{vii}	$\Delta_0^{viii} + \Delta_1^{viii}$
$\cdot 1$	−0225	+006	+00391875	−0006270	−0007955	+000091	+000172
$\cdot 2$	−0400	+008	+00720000	−0008640	−0014784	+000127	+000321
$\cdot 3$	−0525	+007	+00966875	−0007735	−0020014	+000114	+000436
$\cdot 4$	−0600	+004	+01120000	−0004480	−0023296	+000067	+000509
$\cdot 5$	−0625	000	+01171875	0000000	−0024414	000000	+000534
$\cdot 6$	−0600	−004	+01120000	+0004480	−0023296	−000067	+000509
$\cdot 7$	−0525	−007	+00966875	+0007735	−0020014	−000114	+000436
$\cdot 8$	−0400	−008	+00720000	+0008640	−0014784	−000127	+000321
$\cdot 9$	−0225	−006	+00391875	+0006270	−0007955	−000091	+000172

The material chosen for explanation and illustration of the method is given in Table B, the italic figures being the double sums of even differences, usually entered in red on the working sheets.

* L. J. Comrie, *On the Construction of Tables by Interpolation*, M.N.R.A.S., 88, 506 (1928 April).

TABLE B—Original Values and Differences.

x	$\log x = f$	Δ'	Δ''	Δ'''	Δ^{iv}	Δ^v	Δ^{vi}	Δ^{vii}	Δ^{viii}
1.00	0.0000000		-43648		-2696		-578		-295
		+413927	79690	+7606	4523	+869	912	+244	-372
1.10	.0413927		36042		1827		334		-77
		377885	66305	5779	3119	535	501	167	-217
1.20	.0791812		30263		1292		167		-140
		347622	56039	4487	2216	368	307	27	-78
1.30	.1139434		25776		924		140		+62
		+321846	47989	+3563	1620	+228	191	+89	-37
1.40	0.1461280		-22213		-696		-51		-99

If the value of $\log x$ for $x = 1.23$ were to be obtained by the use of the preceding formula, the working would involve the somewhat lengthy multiplications of the differences by their respective coefficients, followed by mixed addition and subtraction of the results, as set out in the accompanying table.

f_0	.0791812	The essence of the present method consists in avoiding the full multiplications by operating with the end figures only (shown in bold type) which are obtained directly from simple tables, and at the same time replacing all subtractions by additions of the corresponding complements. In carrying out the process the work is arranged as follows in ten vertical columns, the first of which contains (if it is desired to record them) the various arguments, the remaining nine being devoted to the components of the end figures of the nine interpolates.
Δ'	+ 1042866	
Δ''	+ 29420	
Δ'''	+ 314	
Δ^{iv}	- 214	
Δ^v	- 2	
Δ^{vi}	+ 6	
Sum	.08990510	
$\log 1.23$.0899051	

Example of interpolation of $\log x$ in the interval 1.20 to 1.30.

Table	Argument	Contribution to end figures of $\log x =$								
		1.21	1.22	1.23	1.24	1.25	1.26	1.27	1.28	1.29
(f_0)	20	20	20	20	20	20	20	20	20	20
I	22	22	44	66	88	10	32	54	76	98
II	- 39	9	16	20	23	24	23	20	16	9
III	+ 4450	67	56	12	78	0	22	88	44	33
IV	- 2150	16	45	92	59	48	59	92	45	16
Sums*		34	81	10	68	02	56	74	01	76

* Only the tens and units are written down.

It will be seen that the components for the interpolate 1.23 are directly related to the end figures of the components in the full working above. The third and fifth differences are treated together in the abridged process as are the fourth and sixth differences, the 12 in the fourth line of the table being the sum of the end figures of the components from Δ''' and Δ^v and the 92 in the fifth line being the complement of the sum of the end figures of the components from Δ^{iv} and Δ^{vi} .

The first line of components is the end figure of f_0 with an added cipher; the second line is obtained from Table I using as argument the two end figures of Δ' , and the third line from Table II using as argument the remainder after multiples of 4000 have been cast out of $\Delta_0'' + \Delta_1''$; the last two lines are obtained from Tables III and IV respectively, the arguments being derived in the manner to be explained later. If the function is negative its sign and that of all the differences should first be reversed, as the object of the process under description is to find the numerical values of the last figures of the interpolates. If the first difference is negative the argument for Table I will be the complement to 100 of its last two figures.

Table I can be dispensed with and the contributions of f_0 and Δ' combined with the aid of an ordinary calculating machine by putting ten times the last two figures of f_0 in the product register, and the last two figures of Δ' on the setting levers or keyboard. As each turn of the handle is made (backward turns if Δ' has the opposite sign to f_0) the last two figures in the product register are recorded at the head of the nine columns. It is easy to make two turns, memorise four figures, turn again without looking at the machine, write down the four figures memorised, and then glance at the machine to pick up the next two figures. On reaching f_1 the setting of the keyboard is changed to the last two figures of the new Δ' , and the work proceeds. The multiplier register (which should have tens transmission) can be made to show the argument at each stage.

In Table II it should be observed that the line is to be copied from left to right even if the right hand argument is used.

In interpolating to fifths the components in the columns relating to $n = .1, .3, .5, .7$ and $.9$ are, of course, omitted.

The four interpolation tables that follow bear the same numbers as the differences for which they cater. If the original function contains p figures the unit employed in the tables is the $p+1$ th figure, the end figures of the interpolates being subsequently rounded off to one figure. Entries which would normally be negative are replaced by their complements to 100, thus avoiding all subtraction. Thus, if $\Delta_0'' + \Delta_1'' = 12$, its contribution to $.1$ or $.9$ would be $12 \times -.0225$ or $-.27$. In the units employed this is -3 and Table II accordingly shows 97.

Table I consists of the products of the argument by 1, 2, 3 . . . 9.

Table II allows for the effect of $\Delta_0'' + \Delta_1''$. It will be noticed that the Besselian coefficients for this difference are symmetrical about $n = .5$, and that 4000 times any of these coefficients is always a multiple of 10. Hence in making the table for the contribution of the second difference it is not necessary to tabulate more than five values for each argument, or to continue the table beyond 4000. Since the "period" of the table is 4000, positive arguments are arranged on the left, and complements to 4000 as negative arguments on the right. A further shortening of the table is made possible by tabulating for every third value only of the argument. The maximum difference between two consecutive tabular values is 2, in which case the intermediate value is taken for an intermediate argument, otherwise the value for the nearest tabular argument is taken. The value -56039 of $\Delta_0'' + \Delta_1''$ occurring in the illustration becomes -39 for the purpose of entering Table II, and it will be seen that 20 is reproduced for $n = .3$.

Examining the coefficients of Δ'' , the period is seen to be 10000, but Table III is not carried beyond 5000, as the entry for $5000 + a$ differs from the entry for a only by the addition of ± 50 for $n = .3$ and $n = .7$. As the coefficients for $1 - n$ are those of n reversed in sign, the entries for $1 - n$ will be the complements of those for n . Thus only one argument is needed, for the entries are read in the reverse order for negative arguments. No attempt should be made to interpolate the table.

Table IV cannot be regarded as periodic and is, therefore, made for both positive and negative arguments. It extends only to 6000, as values greater than this seldom occur; when they do the original interval will usually be found to be too great for convenient working. It is, of course, possible to obtain the entries for higher arguments by adding the values for two tabular arguments, *e.g.* for 8250 the sum of the values for 4120 and 4130 may be taken.

Table V, if required, would be similar to Table III, but with interval 100, while Table VI would resemble Table IV, but with interval 50. These tables, however, are rendered unnecessary by the fact that, for values of Δ^v or $\Delta_o^{iv} + \Delta_r^{iv}$ less than 10000 it is possible to allow for their effect by a slight variation of the arguments Δ''' and $\Delta_o^{iv} + \Delta_r^{iv}$. Similarly, if $\Delta_o^{iv} + \Delta_r^{iv}$ is less than 1000 its use is replaced by a variation of $\Delta_o'' + \Delta_r''$.

Bessel's formula may be written :—

$$f_n = f_o + n\Delta' + \frac{n(n-1)}{4} \left((\Delta_o'' + \Delta_r'') + \frac{(n+1)(n-2)}{12} (\Delta_o^{iv} + \Delta_r^{iv}) \right) \\ + \frac{n(n-1)(n-\frac{1}{2})}{6} \left(\Delta''' + \frac{(n+1)(n-2)}{20} \Delta^v \right) + \text{etc.}$$

The product $(n+1)(n-2)$ varies from -2.09 to -2.25 so that a constant value may be assumed with a resulting error that will be insensible if $\Delta_o^{iv} + \Delta_r^{iv}$ or Δ^v is not too great. In general, any difference of higher order than the third, if not above a certain limit, may be completely allowed for by multiplying it by a constant factor (always negative) and applying the product to the difference two orders lower. Table C shows these factors, the limiting value of the difference to which they can be applied if an error of about .2 units of the last figure is considered negligible, as well as the coefficients by which the differences would have to be multiplied to give the further correction required to represent Bessel's formula perfectly. Table IVA is a critical table giving multiples of .184, while for Δ^v and higher order differences the approximate factors $-\frac{1}{3}$, $-\frac{1}{2}$ and $-\frac{1}{4}$ should meet all cases arising in practice. Critical tables giving multiples of the more accurate factors could easily be constructed if desired.

In the illustration the argument Δ''' is to be taken as $+4487 - \frac{1}{3} \times 368 = +4446$ or $+4450$ to the nearest tabular argument. The argument for $\Delta_o^{iv} + \Delta_r^{iv}$ is $-2216 + \frac{1}{2} \times 307 = -2150$ to the nearest tabular argument.

The final stages of the work are shown in Table D. The figures now known are those given in the first two columns in bold type, the end figure having been produced by rounding the sums just obtained to one figure. By differencing these figures the bold figures shown in the differences are obtained. The smoothness of the fourth differences, which normally is the check on the interpolates, must be assured at this point. An unusually large difference should always stand opposite a value in which the rounding off has been in the opposite direction to the rounding off of its two immediate neighbours, as is the case with the $+5$ opposite 1.26.

TABLE C—Factors for Reduction of Higher Order Differences.

Difference	$\Delta_0^{iv} + \Delta_1^{iv}$		Δ^v		$\Delta_0^{vi} + \Delta_1^{vi}$	
Factor	$-\frac{1}{8}$	-.184	$-\frac{1}{8}$	-.108	$-\frac{1}{8}$	-.207
Limit	100	1000	5000	10000	2000	10000
<i>Residual Coefficients*</i>						
$n = .1$	+.00017	-.00022	+.000040	+.000019	-.000012	+.000016
.2	+.00053	-.00016	+.000025	-.000002	-.000038	+.000012
.3	+.00092	+.00001	+.000004	-.000019	-.000068	.000000
.4	+.00120	+.00016	-.000004	-.000017	-.000090	-.000011
.5	+.00130	+.00022	.000000	.000000	-.000098	-.000016

Difference	Δ^{vii}		$\Delta_0^{viii} + \Delta_1^{viii}$	
Factor	$-\frac{1}{8}$	-.147	$-\frac{1}{8}$	-.218
Limit	50,000	200,000	4000	100,000
<i>Residual Coefficients*</i>				
$n = .1$	+.0000013	-.0000010	+.000013	-.0000017
.2	+.0000033	.0000000	+.000025	-.0000013
.3	+.0000039	+.0000010	+.000036	.0000000
.4	+.0000026	+.0000009	+.000043	+.0000013
.5	.0000000	.0000000	+.000046	+.0000018

The factor for Δ^v is more accurately $-.1077$ and that for Δ^{vii} $-.1466$. The factors and limits for interpolating to fifths are the same as in the table above, with the following exceptions:—

Difference	Δ^v		$\Delta_0^{vi} + \Delta_1^{vi}$	Δ^{vii}
Factor	$-\frac{1}{8}$	-.109	-.207	-.147
Limit	8000	20,000	20,000	300,000
<i>Residual Coefficients*</i>				
$n = .2$	+.000025	+.000010	+.000012	-.0000006
.4	+.000004	-.000011	-.000011	+.0000006

The factor for Δ^v is more accurately $-.1093$ and that for Δ^{vii} $-.1473$.

* These coefficients are, of course, not to be applied. They have been tabulated here merely to show that the use of the given factors for differences less than the limits given is legitimate. Thus if $\Delta_0^{iv} + \Delta_1^{iv} = +1000$, the error introduced by adding $-.184$ to $\Delta_0^{iv} + \Delta_1^{iv}$ is $-.22$ units of the last figure at $n = .1$ and $n = .9$, $-.16$ units at $n = .2$ and $n = .8$, etc.

TABLE D—*Final Stages of the Interpolation.*

x	$\log x = f$	Δ'	Δ''	Δ'''	Δ^{iv}	True - Inter- polated	x	$\log x = f$	Δ'	Δ''	Δ'''	Δ^{iv}	True - Inter- polated
		+	-	+					+	-	+		
1.00	.0000000					[.0]	1.20	.0791812		302		+2	[+.5]
		43214							36041		6		
.01	.0043214		426			-.3	.21	.0827853		296		-2	+.7
		42788		8					35745		4		
.02	.0086002		418		+1	-.3	.22	.0863598		292		+1	+.3
		42370		9					35453		5		
.03	.0128372		409		-1	+.2	.23	.0899051		287		-1	+.1
		41961		8					35166		4		
.04	.0170333		401		-1	+.4	.24	.0934217		283		+2	-.1
		41560		7					34883		6		
.05	.0211893		394		0	.0	.25	.0969100		277		-4	+.1
		41166		7					34606		2		
.06	.0253059		387		+1	-.3	.26	.1003706		275		+5	-.5
		40779		8					34331		7		
.07	.0293838		379		-2	-.2	.27	.1038037		268		-4	+.2
		40400		6					34063		8		
.08	.0334238		373		+2	-.4	.28	.1072100		265		0	-.3
		40027		8					33798		3		
.09	.0374265		365		-2	.0	.29	.1105898		262		+2	-.9
		39662		6					33536		5		
1.10	.0413927		359		0	[-.1]	1.30	.1139484		257		0	[-.5]
		39303		6					33279		5		
.11	.0453230		353		+1	-.2	.31	.1172713		252		-3	.0
		38950		7					33027		2		
.12	.0492180		346		-1	+.2	.32	.1205740		250		+2	-.7
		38604		6					32777		4		
.13	.0530784		340		0	+.4	.33	.1238517		246		+1	-.6
		38264		6					32531		5		
.14	.0569048		334		0	+.5	.34	.1271048		241		-3	.0
		37930		6					32290		2		
.15	.0606978		328		-2	+.4	.35	.1303338		239		+3	-.3
		37602		4					32051		5		
.16	.0644580		324		+4	-.1	.36	.1335389		234		-3	+.1
		37278		8					31817		2		
.17	.0681858		316		-5	+.6	.37	.1367206		232		+2	-.3
		36962		3					31585		4		
.18	.0718820		313		+4	+.1	.38	.1398791		228		-1	-.1
		36649		7					31357		3		
.19	.0755469		306		-3	+.6	.39	.1430148		225			.0
		36343		4					31132				
1.20	.0791812		302		+2	[+.5]	1.40	.1461280					[+.4]

The whole of the second difference can now be inferred and written in. The value opposite each pivotal value should be carefully compared with $\frac{1}{100}(\Delta'' - \frac{1}{2}\Delta^{iv})$, the values of Δ'' and Δ^{iv} being those of the original values. The discordance should never exceed ± 1 . Any suspicious discordance, if not satisfactorily accounted for by the direction and magnitude of the rounding off of the two neighbouring values, should be compared with the discordances at the preceding and following pivotal values, as two consecutive discordances would suggest that a wrong argument had been used in one of the tables.

At present only the end figures of the first differences are known. The full value of the leading first difference is easily found by computing

$$\cdot 1\Delta' - \cdot 0225(\Delta_0'' + \Delta_1'') + \cdot 006\Delta''' + \cdot 004(\Delta_0^{iv} + \Delta_1^{iv})$$

and adjusting the end figure to agree with its already known value. The first difference column is now completed by continuous addition of the second differences, preferably on a machine, and then the function column is produced in the same manner. A complete check on these summations is afforded by the exact reproduction of the pivotal values, the only source of error not eliminated being that of an error in transcription from the machine.

In the last column of Table D a comparison, in units of the last decimal, is made between the known values of $\log x$ and the interpolated values. The largest errors are to be expected in the neighbourhood of points where the pivotal values are in error by nearly half a unit, and it is seen that this is so, the greatest error being $\cdot 9$ units at $x = 1\cdot 29$. If the original values are correct to within half a unit the maximum error that can occur is $1\cdot 2$ units, although it is unlikely that errors greater than $1\cdot 0$ units would occur. The error may, however, be kept definitely under 1 unit in a p -figure table if the original values are known to $p+1$ figures, the $p+1$ th figure being correct to within 1 or even 2 units. Three figures are then used in forming the contribution of $f_0 + n\Delta'$, the last three figures on the machine being rounded to two before being written down. The arguments for the tables are then $\frac{1}{10}(\Delta_0'' + \Delta_1'')$, $\frac{1}{10}\Delta'''$, etc.

It is possible to detect almost every type of mistake that can occur in working this method of interpolation. In Table E several mistakes have been introduced. The argument for $\Delta_0'' + \Delta_1''$ was taken as -93 instead of -39 ; this is revealed at once by a comparison of the end figure of the new Δ'' with its theoretical value. The error in subtraction in the column Δ'' at $1\cdot 23$ would result in a failure to reproduce

TABLE E—*Detection of Errors.*

x	Sums	f	Δ'	Δ''	Δ'''	Δ^{iv}
1·20		2		0		-4
1·21	46	5	3	8	2	+5
1·22	02	0	5	1	7	-3
1·23	39	4	4	7	4	+1
1·24	01	0	6	2	5	-1
1·25	36	4	4	8	4	-2
1·26	89	0	6	2	2	+6
1·27	03	0	0	6	8	-5
1·28	22	2	2	8	3	0
1·29	88	9	7	5	3	+3
1·30		4	5	2	6	-2

the original value at 1.30; an erroneous subtraction in Δ' would be detected in the same manner. The error in f at 1.26 due to incorrect rounding off (or an error in f due to incorrect addition) is detected by the fact that the large fourth difference of +6 at this point cannot be accounted for in the normal way.

It is true that very small errors due to the use of erroneous arguments may remain undetected, but if the new differences are carefully examined by an experienced and vigilant computer, and especially if the final results are produced and printed on a Burroughs machine, there is no danger of a serious error being passed.

Bessel's formula has been chosen partly because of the symmetrical nature of its coefficients and particularly because its third difference coefficients are very small. A Table III based on Gauss's formula, for instance, would not reach a period till 20000, and would require an interval as small as the present Table II, because its maximum coefficient is nearly eight times the maximum coefficient of the third difference in Bessel's formula. Further, the present Table III, although having the very simple period of 10000, need not be carried to that point, because the entries required for negative arguments are merely those for positive arguments, but in the reverse order. These advantages easily outweigh the extra labour of forming the double differences $\Delta_0'' + \Delta_1''$, etc. The first tables made were for Everett's formula, which ranks with Bessel's as one of the best of the central difference formulæ, but these were abandoned in favour of the simpler tables now in use.

The application of mechanical calculators to the process is fully described in the article already cited. The Hollerith tabulating machines afford great assistance in the preparation of the end figures, while the Brunsviga-Dupla or a Burroughs Class 11 machine will perform the double summations required to produce the function from its second differences.

The method is termed the end-figure method of interpolation. The idea of obtaining the end figures of second and third differences has been used on several occasions, but Mr. T. C. Hudson, formerly of this office, was the first to realise the advantages of obtaining the end figures of the interpolates themselves. Mr. Hudson obtained his end figures by graphical methods; the 2-figure table method was developed as being more accurate and better suited to routine work, especially as it may be done with unskilled labour.

INTERPOLATION TABLES.

TABLE I. ARGUMENT, LAST TWO FIGURES OF Δ'

0	0	0	0	0	0	0	0	0	0	50	50	0	50	0	50	0	50	0	50
1	1	2	3	4	5	6	7	8	9	51	51	2	53	4	55	6	57	8	59
2	2	4	6	8	10	12	14	16	18	52	52	4	56	8	60	12	64	16	68
3	3	6	9	12	15	18	21	24	27	53	53	6	59	12	65	18	71	24	77
4	4	8	12	16	20	24	28	32	36	54	54	8	62	16	70	24	78	32	86
5	5	10	15	20	25	30	35	40	45	55	55	10	65	20	75	30	85	40	95
6	6	12	18	24	30	36	42	48	54	56	56	12	68	24	80	36	92	48	4
7	7	14	21	28	35	42	49	56	63	57	57	14	71	28	85	42	99	56	13
8	8	16	24	32	40	48	56	64	72	58	58	16	74	32	90	48	6	64	22
9	9	18	27	36	45	54	63	72	81	59	59	18	77	36	95	54	13	72	31
10	10	20	30	40	50	60	70	80	90	60	60	20	80	40	0	60	20	80	40
11	11	22	33	44	55	66	77	88	99	61	61	22	83	44	5	66	27	88	49
12	12	24	36	48	60	72	84	96	8	62	62	24	86	48	10	72	34	96	58
13	13	26	39	52	65	78	91	4	17	63	63	26	89	52	15	78	41	4	67
14	14	28	42	56	70	84	98	12	26	64	64	28	92	56	20	84	48	12	76
15	15	30	45	60	75	90	5	20	35	65	65	30	95	60	25	90	55	20	85
16	16	32	48	64	80	96	12	28	44	66	66	32	98	64	30	96	62	28	94
17	17	34	51	68	85	2	19	36	53	67	67	34	1	68	35	2	69	36	3
18	18	36	54	72	90	8	26	44	62	68	68	36	4	72	40	8	76	44	12
19	19	38	57	76	95	14	33	52	71	69	69	38	7	76	45	14	83	52	21
20	20	40	60	80	0	20	40	60	80	70	70	40	10	80	50	20	90	60	30
21	21	42	63	84	5	26	47	68	89	71	71	42	13	84	55	26	97	68	39
22	22	44	66	88	10	32	54	76	98	72	72	44	16	88	60	32	4	76	48
23	23	46	69	92	15	38	61	84	7	73	73	46	19	92	65	38	11	84	57
24	24	48	72	96	20	44	68	92	16	74	74	48	22	96	70	44	18	92	66
25	25	50	75	0	25	50	75	0	25	75	75	50	25	0	75	50	25	0	75
26	26	52	78	4	30	56	82	8	34	76	76	52	28	4	80	56	32	8	84
27	27	54	81	8	35	62	89	16	43	77	77	54	31	8	85	62	39	16	93
28	28	56	84	12	40	68	96	24	52	78	78	56	34	12	90	68	46	24	2
29	29	58	87	16	45	74	3	32	61	79	79	58	37	16	95	74	53	32	11
30	30	60	90	20	50	80	10	40	70	80	80	60	40	20	0	80	60	40	20
31	31	62	93	24	55	86	17	48	79	81	81	62	43	24	5	86	67	48	29
32	32	64	96	28	60	92	24	56	88	82	82	64	46	28	10	92	74	56	38
33	33	66	99	32	65	98	31	64	97	83	83	66	49	32	15	98	81	64	47
34	34	68	2	36	70	4	38	72	6	84	84	68	52	36	20	4	88	72	56
35	35	70	5	40	75	10	45	80	15	85	85	70	55	40	25	10	95	80	65
36	36	72	8	44	80	16	52	88	24	86	86	72	58	44	30	16	2	88	74
37	37	74	11	48	85	22	59	96	33	87	87	74	61	48	35	22	9	96	83
38	38	76	14	52	90	28	66	4	42	88	88	76	64	52	40	28	16	4	92
39	39	78	17	56	95	34	73	12	51	89	89	78	67	56	45	34	23	12	1
40	40	80	20	60	0	40	80	20	60	90	90	80	70	60	50	40	30	20	10
41	41	82	23	64	5	46	87	28	69	91	91	82	73	64	55	46	37	28	19
42	42	84	26	68	10	52	94	36	78	92	92	84	76	68	60	52	44	36	28
43	43	86	29	72	15	58	1	44	87	93	93	86	79	72	65	58	51	44	37
44	44	88	32	76	20	64	8	52	96	94	94	88	82	76	70	64	58	52	46
45	45	90	35	80	25	70	15	60	5	95	95	90	85	80	75	70	65	60	55
46	46	92	38	84	30	76	22	68	14	96	96	92	88	84	80	76	72	68	64
47	47	94	41	88	35	82	29	76	23	97	97	94	91	88	85	82	79	76	73
48	48	96	44	92	40	88	36	84	32	98	98	96	94	92	90	88	86	84	82
49	49	98	47	96	45	94	43	92	41	99	99	98	97	96	95	94	93	92	91

INTERPOLATION TABLES.

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TABLE II. ARGUMENT $\Delta'' + \Delta'$

Positive arguments on the left. Negative arguments on the right.

0 0 0 0 0 0 4000	150 66 40 21 10 6 3850	300 32 80 42 20 12 3700
3 99 99 98 98 98 3997	153 66 39 20 8 4 3847	303 32 79 41 18 11 3697
6 99 98 97 96 96 3994	156 65 38 18 6 2 3844	306 31 78 39 16 9 3694
9 98 96 95 95 94 3991	159 64 36 17 5 1 3841	309 30 76 38 15 7 3691
12 97 95 94 93 92 3988	162 64 35 15 3 99 3838	312 30 75 36 13 5 3688
15 97 94 92 91 91 3985	165 63 34 13 1 97 3835	315 29 74 35 11 3 3685
18 96 93 91 89 89 3982	168 62 33 12 99 95 3832	318 28 73 33 9 1 3682
21 95 92 89 87 87 3979	171 62 32 10 97 93 3829	321 28 72 31 7 99 3679
24 95 90 87 86 85 3976	174 61 30 9 96 91 3826	324 27 70 30 6 98 3676
27 94 89 86 84 83 3973	177 60 29 7 94 89 3823	327 26 69 28 4 96 3673
30 93 88 84 82 81 3970	180 60 28 6 92 88 3820	330 26 68 27 2 94 3670
33 93 87 83 80 79 3967	183 59 27 4 90 86 3817	333 25 67 25 0 92 3667
36 92 86 81 78 78 3964	186 58 26 2 88 84 3814	336 24 66 24 98 90 3664
39 91 84 80 77 76 3961	189 57 24 1 87 82 3811	339 24 64 22 97 88 3661
42 91 83 78 75 74 3958	192 57 23 99 85 80 3808	342 23 63 20 95 86 3658
45 90 82 76 73 72 3955	195 56 22 98 83 78 3805	345 22 62 19 93 84 3655
48 89 81 75 71 70 3952	198 55 21 96 81 76 3802	348 22 61 17 91 82 3652
51 89 80 73 69 68 3949	201 55 20 94 79 74 3799	351 21 60 16 89 81 3649
54 88 78 72 68 66 3946	204 54 18 93 78 72 3796	354 20 58 14 88 79 3646
57 87 77 70 66 64 3943	207 53 17 91 76 71 3793	357 20 57 13 86 77 3643
60 86 76 68 64 62 3940	210 53 16 90 74 69 3790	360 19 56 11 84 75 3640
63 86 75 67 62 61 3937	213 52 15 88 72 67 3787	363 18 55 9 82 73 3637
66 85 74 65 60 59 3934	216 51 14 87 70 65 3784	366 18 54 8 80 71 3634
69 84 72 64 59 57 3931	219 51 12 85 69 63 3781	369 17 52 6 79 69 3631
72 84 71 62 57 55 3928	222 50 11 83 67 61 3778	372 16 51 5 77 68 3628
75 83 70 61 55 53 3925	225 49 10 82 65 59 3775	375 16 50 3 75 66 3625
78 82 69 59 53 51 3922	228 49 9 80 63 58 3772	378 15 49 2 73 64 3622
81 82 68 57 51 49 3919	231 48 8 79 61 56 3769	381 14 48 0 71 62 3619
84 81 66 56 50 48 3916	234 47 6 77 60 54 3766	384 14 46 98 70 60 3616
87 80 65 54 48 46 3913	237 47 5 76 58 52 3763	387 13 45 97 68 58 3613
90 80 64 53 46 44 3910	240 46 4 74 56 50 3760	390 12 44 95 66 56 3610
93 79 63 51 44 42 3907	243 45 3 72 54 48 3757	393 12 43 94 64 54 3607
96 78 62 50 42 40 3904	246 45 2 71 52 46 3754	396 11 42 92 62 52 3604
99 78 60 48 41 38 3901	249 44 0 69 51 44 3751	399 10 40 91 61 51 3601
102 77 59 46 39 36 3898	252 43 99 68 49 42 3748	402 10 39 89 59 49 3598
105 76 58 45 37 34 3895	255 43 98 66 47 41 3745	405 9 38 87 57 47 3595
108 76 57 43 35 32 3892	258 42 97 65 45 39 3742	408 8 37 86 55 45 3592
111 75 56 42 33 31 3889	261 41 96 63 43 37 3739	411 8 36 84 53 43 3589
114 74 54 40 32 29 3886	264 41 94 61 42 35 3736	414 7 34 83 52 41 3586
117 74 53 39 30 27 3883	267 40 93 60 40 33 3733	417 6 33 81 50 39 3583
120 73 52 37 28 25 3880	270 39 92 58 38 31 3730	420 6 32 80 48 38 3580
123 72 51 35 26 23 3877	273 39 91 57 36 29 3727	423 5 31 78 46 36 3577
126 72 50 34 24 21 3874	276 38 90 55 34 28 3724	426 4 30 76 44 34 3574
129 71 48 32 23 19 3871	279 37 88 54 33 26 3721	429 3 28 75 43 32 3571
132 70 47 31 21 18 3868	282 37 87 52 31 24 3718	432 3 27 73 41 30 3568
135 70 46 29 19 16 3865	285 36 86 50 29 22 3715	435 2 26 72 39 28 3565
138 69 45 28 17 14 3862	288 35 85 49 27 20 3712	438 1 25 70 37 26 3562
141 68 44 26 15 12 3859	291 35 84 47 25 18 3709	441 1 24 68 35 24 3559
144 68 42 24 14 10 3856	294 34 82 46 24 16 3706	444 0 22 67 34 22 3556
147 67 41 23 12 8 3853	297 33 81 44 22 14 3703	447 99 21 65 32 21 3553
150 66 40 21 10 6 3850	300 32 80 42 20 12 3700	450 99 20 64 30 19 3550

INTERPOLATION TABLES.

TABLE II. ARGUMENT $\Delta'' + \Delta'$

Positive arguments on the left. Negative arguments on the right.

450	99	20	64	30	19	3550	600	65	60	85	40	25	3400	750	31	0	6	50	31	3250
453	98	19	62	28	17	3547	603	64	59	83	38	23	3397	753	31	99	5	48	29	3247
456	97	18	61	26	15	3544	606	64	58	82	36	21	3394	756	30	98	3	46	28	3244
459	97	16	59	25	13	3541	609	63	56	80	35	19	3391	759	29	96	2	45	26	3241
462	96	15	57	23	11	3538	612	62	55	79	33	18	3388	762	29	95	0	43	24	3238
465	95	14	56	21	9	3535	615	62	54	77	31	16	3385	765	28	94	98	41	22	3235
468	95	13	54	19	8	3532	618	61	53	76	29	14	3382	768	27	93	97	39	20	3232
471	94	12	53	17	6	3529	621	60	52	74	27	12	3379	771	27	92	95	37	18	3229
474	93	10	51	16	4	3526	624	60	50	72	26	10	3376	774	26	90	94	36	16	3226
477	93	9	50	14	2	3523	627	59	49	71	24	8	3373	777	25	89	92	34	14	3223
480	92	8	48	12	0	3520	630	58	48	69	22	6	3370	780	24	88	90	32	12	3220
483	91	7	46	10	98	3517	633	58	47	68	20	4	3367	783	24	87	89	30	11	3217
486	91	6	45	8	96	3514	636	57	46	66	18	2	3364	786	23	86	87	28	9	3214
489	90	4	43	7	94	3511	639	56	44	65	17	1	3361	789	22	84	86	27	7	3211
492	89	3	42	5	92	3508	642	56	43	63	15	99	3358	792	22	83	84	25	5	3208
495	89	2	40	3	91	3505	645	55	42	61	13	97	3355	795	21	82	83	23	3	3205
498	88	1	39	1	89	3502	648	54	41	60	11	95	3352	798	20	81	81	21	1	3202
501	87	0	37	99	87	3499	651	54	40	58	9	93	3349	801	20	80	79	19	99	3199
504	87	98	35	98	85	3496	654	53	38	57	8	91	3346	804	19	78	78	18	98	3196
507	86	97	34	96	83	3493	657	52	37	55	6	89	3343	807	18	77	76	16	96	3193
510	85	96	32	94	81	3490	660	52	36	54	4	88	3340	810	18	76	75	14	94	3190
513	85	95	31	92	79	3487	663	51	35	52	2	86	3337	813	17	75	73	12	92	3187
516	84	94	29	90	78	3484	666	50	34	50	0	84	3334	816	16	74	72	10	90	3184
519	83	92	28	89	76	3481	669	49	32	49	99	82	3331	819	16	72	70	9	88	3181
522	83	91	26	87	74	3478	672	49	31	47	97	80	3328	822	15	71	68	7	86	3178
525	82	90	24	85	72	3475	675	48	30	46	95	78	3325	825	14	70	67	5	84	3175
528	81	89	23	83	70	3472	678	47	29	44	93	76	3322	828	14	69	65	3	82	3172
531	81	88	21	81	68	3469	681	47	28	42	91	74	3319	831	13	68	64	1	81	3169
534	80	86	20	80	66	3466	684	46	26	41	90	72	3316	834	12	66	62	0	79	3166
537	79	85	18	78	64	3463	687	45	25	39	88	71	3313	837	12	65	61	98	77	3163
540	78	84	16	76	62	3460	690	45	24	38	86	69	3310	840	11	64	59	96	75	3160
543	78	83	15	74	61	3457	693	44	23	36	84	67	3307	843	10	63	57	94	73	3157
546	77	82	13	72	59	3454	696	43	22	35	82	65	3304	846	10	62	56	92	71	3154
549	76	80	12	71	57	3451	699	43	20	33	81	63	3301	849	9	60	54	91	69	3151
552	76	79	10	69	55	3448	702	42	19	31	79	61	3298	852	8	59	53	89	68	3148
555	75	78	9	67	53	3445	705	41	18	30	77	59	3295	855	8	58	51	87	66	3145
558	74	77	7	65	51	3442	708	41	17	28	75	58	3292	858	7	57	50	85	64	3142
561	74	76	5	63	49	3439	711	40	16	27	73	56	3289	861	6	56	48	83	62	3139
564	73	74	4	62	48	3436	714	39	14	25	72	54	3286	864	6	54	46	82	60	3136
567	72	73	2	60	46	3433	717	39	13	24	70	52	3283	867	5	53	45	80	58	3133
570	72	72	1	58	44	3430	720	38	12	22	68	50	3280	870	4	52	43	78	56	3130
573	71	71	99	56	42	3427	723	37	11	20	66	48	3277	873	4	51	42	76	54	3127
576	70	70	98	54	40	3424	726	37	10	19	64	46	3274	876	3	50	40	74	52	3124
579	70	68	96	53	38	3421	729	36	8	17	63	44	3271	879	2	48	39	73	51	3121
582	69	67	94	51	36	3418	732	35	7	16	61	42	3268	882	2	47	37	71	49	3118
585	68	66	93	49	34	3415	735	35	6	14	59	41	3265	885	1	46	35	69	47	3115
588	68	65	91	47	32	3412	738	34	5	13	57	39	3262	888	0	45	34	67	45	3112
591	67	64	90	45	31	3409	741	33	4	11	55	37	3259	891	0	44	32	65	43	3109
594	66	62	88	44	29	3406	744	33	2	9	54	35	3256	894	99	42	31	64	41	3106
597	66	61	87	42	27	3403	747	32	1	8	52	33	3253	897	98	41	29	62	39	3103
600	65	60	85	40	25	3400	750	31	0	6	50	31	3250	900	98	40	28	60	38	3100

INTERPOLATION TABLES.

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TABLE II. ARGUMENT $\Delta'' + \Delta'''$

Positive arguments on the left. Negative arguments on the right.

10 28 60 38 3100	1050 64 80 49 70 44 2950	1200 30 20 70 80 50 2800
39 26 58 36 3097	1053 63 79 47 68 42 2947	1203 29 19 68 78 48 2797
38 24 56 34 3094	1056 62 78 46 66 40 2944	1206 29 18 67 76 46 2794
36 23 55 32 3091	1059 62 76 44 65 38 2941	1209 28 16 65 75 44 2791
35 21 53 30 3088	1062 61 75 42 63 36 2938	1212 27 15 64 73 42 2788
34 20 51 28 3085	1065 60 74 41 61 34 2935	1215 27 14 62 71 41 2785
33 18 49 26 3082	1068 60 73 39 59 32 2932	1218 26 13 61 69 39 2782
32 16 47 24 3079	1071 59 72 38 57 31 2929	1221 25 12 59 67 37 2779
30 15 46 22 3076	1074 58 70 36 56 29 2926	1224 25 10 57 66 35 2776
29 13 44 21 3073	1077 58 69 35 54 27 2923	1227 24 9 56 64 33 2773
28 12 42 19 3070	1080 57 68 33 52 25 2920	1230 23 8 54 62 31 2770
27 10 40 17 3067	1083 56 67 31 50 23 2917	1233 23 7 53 60 29 2767
26 9 38 15 3064	1086 56 66 30 48 21 2914	1236 22 6 51 58 28 2764
24 7 37 13 3061	1089 55 64 28 47 19 2911	1239 21 4 50 57 26 2761
23 5 35 11 3058	1092 54 63 27 45 18 2908	1242 21 3 48 55 24 2758
22 4 33 9 3055	1095 54 62 25 43 16 2905	1245 20 2 46 53 22 2755
21 2 31 8 3052	1098 53 61 24 41 14 2902	1248 19 1 45 51 20 2752
20 1 29 6 3049	1101 52 60 22 39 12 2899	1251 19 0 43 49 18 2749
18 99 28 4 3046	1104 52 58 20 38 10 2896	1254 18 98 42 48 16 2746
17 98 26 2 3043	1107 51 57 19 36 8 2893	1257 17 97 40 46 14 2743
16 96 24 0 3040	1110 50 56 17 34 6 2890	1260 16 96 38 44 12 2740
15 94 22 98 3037	1113 50 55 16 32 4 2887	1263 16 95 37 42 11 2737
14 93 20 96 3034	1116 49 54 14 30 2 2884	1266 15 94 35 40 9 2734
12 91 19 94 3031	1119 48 52 13 29 1 2881	1269 14 92 34 39 7 2731
11 90 17 92 3028	1122 48 51 11 27 99 2878	1272 14 91 32 37 5 2728
10 88 15 91 3025	1125 47 50 9 25 97 2875	1275 13 90 31 35 3 2725
9 87 13 89 3022	1128 46 49 8 23 95 2872	1278 12 89 29 33 1 2722
8 85 11 87 3019	1131 46 48 6 21 93 2869	1281 12 88 27 31 99 2719
6 83 10 85 3016	1134 45 46 5 20 91 2866	1284 11 86 26 30 98 2716
5 82 8 83 3013	1137 44 45 3 18 89 2863	1287 10 85 24 28 96 2713
4 80 6 81 3010	1140 44 44 2 16 88 2860	1290 10 84 23 26 94 2710
3 79 4 79 3007	1143 43 43 0 14 86 2857	1293 9 83 21 24 92 2707
2 77 2 78 3004	1146 42 42 98 12 84 2854	1296 8 82 20 22 90 2704
0 76 1 76 3001	1149 41 40 97 11 82 2851	1299 8 80 18 21 88 2701
99 74 99 74 2998	1152 41 39 95 9 80 2848	1302 7 79 16 19 86 2698
98 72 97 72 2995	1155 40 38 94 7 78 2845	1305 6 78 15 17 84 2695
97 71 95 70 2992	1158 39 37 92 5 76 2842	1308 6 77 13 15 82 2692
96 69 93 68 2989	1161 39 36 90 3 74 2839	1311 5 76 12 13 81 2689
94 68 92 66 2986	1164 38 34 89 2 72 2836	1314 4 74 10 12 79 2686
93 66 90 64 2983	1167 37 33 87 0 71 2833	1317 4 73 9 10 77 2683
92 64 88 62 2980	1170 37 32 86 98 69 2830	1320 3 72 7 8 75 2680
91 63 86 61 2977	1173 36 31 84 96 67 2827	1323 2 71 5 6 73 2677
90 61 84 59 2974	1176 35 30 83 94 65 2824	1326 2 70 4 4 71 2674
88 60 83 57 2971	1179 35 28 81 93 63 2821	1329 1 68 2 3 69 2671
87 58 81 55 2968	1182 34 27 79 91 61 2818	1332 0 67 1 1 68 2668
86 57 79 53 2965	1185 33 26 78 89 59 2815	1335 0 66 99 99 66 2665
85 55 77 51 2962	1188 33 25 76 87 58 2812	1338 99 65 98 97 64 2662
84 53 75 49 2959	1191 32 24 75 85 56 2809	1341 98 64 96 95 62 2659
82 52 74 48 2956	1194 31 22 73 84 54 2806	1344 98 62 94 94 60 2656
81 50 72 46 2953	1197 31 21 72 82 52 2803	1347 97 61 93 92 58 2653
80 49 70 44 2950	1200 30 20 70 80 50 2800	1350 96 60 91 90 56 2650

INTERPOLATION TABLES.

TABLE II. ARGUMENT $\Delta'' + \Delta'$

Positive arguments on the left. Negative arguments on the right.

1350	96	60	91	90	56	2650	1500	62	0	12	0	62	2500	1650	29	40	34	10	69	2350
1353	96	59	90	88	54	2647	1503	62	99	11	98	61	2497	1653	28	39	32	8	67	2347
1356	95	58	88	86	52	2644	1506	61	98	9	96	59	2494	1656	27	38	31	6	65	2344
1359	94	56	87	85	51	2641	1509	60	96	8	95	57	2491	1659	27	36	29	5	63	2341
1362	94	55	85	83	49	2638	1512	60	95	6	93	55	2488	1662	26	35	27	3	61	2338
1365	93	54	83	81	47	2635	1515	59	94	5	91	53	2485	1665	25	34	26	1	59	2335
1368	92	53	82	79	45	2632	1518	58	93	3	89	51	2482	1668	25	33	24	99	58	2332
1371	92	52	80	77	43	2629	1521	58	92	1	87	49	2479	1671	24	32	23	97	56	2329
1374	91	50	79	76	41	2626	1524	57	90	0	86	48	2476	1674	23	30	21	96	54	2326
1377	90	49	77	74	39	2623	1527	56	89	98	84	46	2473	1677	23	29	20	94	52	2323
1380	90	48	76	72	38	2620	1530	56	88	97	82	44	2470	1680	22	28	18	92	50	2320
1383	89	47	74	70	36	2617	1533	55	87	95	80	42	2467	1683	21	27	16	90	48	2317
1386	88	46	72	68	34	2614	1536	54	86	94	78	40	2464	1686	21	26	15	88	46	2314
1389	87	44	71	67	32	2611	1539	54	84	92	77	38	2461	1689	20	24	13	87	44	2311
1392	87	43	69	65	30	2608	1542	53	83	90	75	36	2458	1692	19	23	12	85	42	2308
1395	86	42	68	63	28	2605	1545	52	82	89	73	34	2455	1695	19	22	10	83	41	2305
1398	85	41	66	61	26	2602	1548	52	81	87	71	32	2452	1698	18	21	9	81	39	2302
1401	85	40	64	59	24	2599	1551	51	80	86	69	31	2449	1701	17	20	7	79	37	2299
1404	84	38	63	58	22	2596	1554	50	78	84	68	29	2446	1704	17	18	5	78	35	2296
1407	83	37	61	56	21	2593	1557	50	77	83	66	27	2443	1707	16	17	4	76	33	2293
1410	83	36	60	54	19	2590	1560	49	76	81	64	25	2440	1710	15	16	2	74	31	2290
1413	82	35	58	52	17	2587	1563	48	75	79	62	23	2437	1713	15	15	1	72	29	2287
1416	81	34	57	50	15	2584	1566	48	74	78	60	21	2434	1716	14	14	99	70	28	2284
1419	81	32	55	49	13	2581	1569	47	72	76	59	19	2431	1719	13	12	98	69	26	2281
1422	80	31	53	47	11	2578	1572	46	71	75	57	18	2428	1722	13	11	96	67	24	2278
1425	79	30	52	45	9	2575	1575	46	70	73	55	16	2425	1725	12	10	94	65	22	2275
1428	79	29	50	43	8	2572	1578	45	69	72	53	14	2422	1728	11	9	93	63	20	2272
1431	78	28	49	41	6	2569	1581	44	68	70	51	12	2419	1731	11	8	91	61	18	2269
1434	77	26	47	40	4	2566	1584	44	66	68	50	10	2416	1734	10	6	90	60	16	2266
1437	77	25	46	38	2	2563	1587	43	65	67	48	8	2413	1737	9	5	88	58	14	2263
1440	76	24	44	36	0	2560	1590	42	64	65	46	6	2410	1740	8	4	86	56	12	2260
1443	75	23	42	34	98	2557	1593	42	63	64	44	4	2407	1743	8	3	85	54	11	2257
1446	75	22	41	32	96	2554	1596	41	62	62	42	2	2404	1746	7	2	83	52	9	2254
1449	74	20	39	31	94	2551	1599	40	60	61	41	1	2401	1749	6	0	82	51	7	2251
1452	73	19	38	29	92	2548	1602	40	59	59	39	99	2398	1752	6	99	80	49	5	2248
1455	73	18	36	27	91	2545	1605	39	58	57	37	97	2395	1755	5	98	79	47	3	2245
1458	72	17	35	25	89	2542	1608	38	57	56	35	95	2392	1758	4	97	77	45	1	2242
1461	71	16	33	23	87	2539	1611	38	56	54	33	93	2389	1761	4	96	75	43	99	2239
1464	71	14	31	22	85	2536	1614	37	54	53	32	91	2386	1764	3	94	74	42	98	2236
1467	70	13	30	20	83	2533	1617	36	53	51	30	89	2383	1767	2	93	72	40	96	2233
1470	69	12	28	18	81	2530	1620	36	52	50	28	88	2380	1770	2	92	71	38	94	2230
1473	69	11	27	16	79	2527	1623	35	51	48	26	86	2377	1773	1	91	69	36	92	2227
1476	68	10	25	14	78	2524	1626	34	50	46	24	84	2374	1776	0	90	68	34	90	2224
1479	67	8	24	13	76	2521	1629	33	48	45	23	82	2371	1779	0	88	66	33	88	2221
1482	67	7	22	11	74	2518	1632	33	47	43	21	80	2368	1782	99	87	64	31	86	2218
1485	66	6	20	9	72	2515	1635	32	46	42	19	78	2365	1785	98	86	63	29	84	2215
1488	65	5	19	7	70	2512	1638	31	45	40	17	76	2362	1788	98	85	61	27	82	2212
1491	65	4	17	5	68	2509	1641	31	44	38	15	74	2359	1791	97	84	60	25	81	2209
1494	64	2	16	4	66	2506	1644	30	42	37	14	72	2356	1794	96	82	58	24	79	2206
1497	63	1	14	2	64	2503	1647	29	41	35	12	71	2353	1797	96	81	57	22	77	2203
1500	62	0	12	0	62	2500	1650	29	40	34	10	69	2350	1800	95	80	55	20	75	2200

INTERPOLATION TABLES.

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TABLE II. ARGUMENT $\Delta'_0 + \Delta'_1$

Positive arguments on the left.

Negative arguments on the right.

1800	95	80	55	20	75	2200	1950	61	20	76	30	81	2050	2100	28	60	98	40	88	1900
1803	94	79	53	18	73	2197	1953	61	19	75	28	79	2047	2103	27	59	96	38	86	1897
1806	94	78	52	16	71	2194	1956	60	18	73	26	78	2044	2106	26	58	94	36	84	1894
1809	93	76	50	15	69	2191	1959	59	16	72	25	76	2041	2109	25	56	93	35	82	1891
1812	92	75	49	13	68	2188	1962	59	15	70	23	74	2038	2112	25	55	91	33	80	1888
1815	92	74	47	11	66	2185	1965	58	14	68	21	72	2035	2115	24	54	90	31	78	1885
1818	91	73	46	9	64	2182	1968	57	13	67	19	70	2032	2118	23	53	88	29	76	1882
1821	90	72	44	7	62	2179	1971	57	12	65	17	68	2029	2121	23	52	86	27	74	1879
1824	90	70	42	6	60	2176	1974	56	10	64	16	66	2026	2124	22	50	85	26	72	1876
1827	89	69	41	4	58	2173	1977	55	9	62	14	64	2023	2127	21	49	83	24	71	1873
1830	88	68	39	2	56	2170	1980	54	8	60	12	62	2020	2130	21	48	82	22	69	1870
1833	88	67	38	0	54	2167	1983	54	7	59	10	61	2017	2133	20	47	80	20	67	1867
1836	87	66	36	98	52	2164	1986	53	6	57	8	59	2014	2136	19	46	79	18	65	1864
1839	86	64	35	97	51	2161	1989	52	4	56	7	57	2011	2139	19	44	77	17	63	1861
1842	86	63	33	95	49	2158	1992	52	3	54	5	55	2008	2142	18	43	75	15	61	1858
1845	85	62	31	93	47	2155	1995	51	2	53	3	53	2005	2145	17	42	74	13	59	1855
1848	84	61	30	91	45	2152	1998	50	1	51	1	51	2002	2148	17	41	72	11	58	1852
1851	84	60	28	89	43	2149	2001	50	0	49	99	49	1999	2151	16	40	71	9	56	1849
1854	83	58	27	88	41	2146	2004	49	98	48	98	48	1996	2154	15	38	69	8	54	1846
1857	82	57	25	86	39	2143	2007	48	97	46	96	46	1993	2157	15	37	68	6	52	1843
1860	82	56	24	84	38	2140	2010	48	96	45	94	44	1990	2160	14	36	66	4	50	1840
1863	81	55	22	82	36	2137	2013	47	95	43	92	42	1987	2163	13	35	64	2	48	1837
1866	80	54	20	80	34	2134	2016	46	94	42	90	40	1984	2166	13	34	63	0	46	1834
1869	79	52	19	79	32	2131	2019	46	92	40	89	38	1981	2169	12	32	61	99	44	1831
1872	79	51	17	77	30	2128	2022	45	91	38	87	36	1978	2172	11	31	60	97	42	1828
1875	78	50	16	75	28	2125	2025	44	90	37	85	34	1975	2175	11	30	58	95	41	1825
1878	77	49	14	73	26	2122	2028	44	89	35	83	32	1972	2178	10	29	57	93	39	1822
1881	77	48	12	71	24	2119	2031	43	88	34	81	31	1969	2181	9	28	55	91	37	1819
1884	76	46	11	70	22	2116	2034	42	86	32	80	29	1966	2184	9	26	53	90	35	1816
1887	75	45	9	68	21	2113	2037	42	85	31	78	27	1963	2187	8	25	52	88	33	1813
1890	75	44	8	66	19	2110	2040	41	84	29	76	25	1960	2190	7	24	50	86	31	1810
1893	74	43	6	64	17	2107	2043	40	83	27	74	23	1957	2193	7	23	49	84	29	1807
1896	73	42	5	62	15	2104	2046	40	82	26	72	21	1954	2196	6	22	47	82	28	1804
1899	73	40	3	61	13	2101	2049	39	80	24	71	19	1951	2199	5	20	46	81	26	1801
1902	72	39	1	59	11	2098	2052	38	79	23	69	18	1948	2202	5	19	44	79	24	1798
1905	71	38	0	57	9	2095	2055	38	78	21	67	16	1945	2205	4	18	42	77	22	1795
1908	71	37	98	55	8	2092	2058	37	77	20	65	14	1942	2208	3	17	41	75	20	1792
1911	70	36	97	53	6	2089	2061	36	76	18	63	12	1939	2211	3	16	39	73	18	1789
1914	69	34	95	52	4	2086	2064	36	74	16	62	10	1936	2214	2	14	38	72	16	1786
1917	69	33	94	50	2	2083	2067	35	73	15	60	8	1933	2217	1	13	36	70	14	1783
1920	68	32	92	48	0	2080	2070	34	72	13	58	6	1930	2220	0	12	34	68	12	1780
1923	67	31	90	46	98	2077	2073	34	71	12	56	4	1927	2223	0	11	33	66	11	1777
1926	67	30	89	44	96	2074	2076	33	70	10	54	2	1924	2226	99	10	31	64	9	1774
1929	66	28	87	43	94	2071	2079	32	68	9	53	1	1921	2229	98	8	30	63	7	1771
1932	65	27	86	41	92	2068	2082	32	67	7	51	99	1918	2232	98	7	28	61	5	1768
1935	65	26	84	39	91	2065	2085	31	66	5	49	97	1915	2235	97	6	27	59	3	1765
1938	64	25	83	37	89	2062	2088	30	65	4	47	95	1912	2238	96	5	25	57	1	1762
1941	63	24	81	35	87	2059	2091	30	64	2	45	93	1909	2241	96	4	23	55	99	1759
1944	63	22	79	34	85	2056	2094	29	62	1	44	91	1906	2244	95	2	22	54	98	1756
1947	62	21	78	32	83	2053	2097	28	61	99	42	89	1903	2247	94	1	20	52	96	1753
1950	61	20	76	30	81	2050	2100	28	60	98	40	88	1900	2250	94	0	19	50	94	1750

INTERPOLATION TABLES.

TABLE II. ARGUMENT $\Delta'' + \Delta''_1$

Positive arguments on the left. Negative arguments on the right.

2250	94	0	19	50	94	1750	2400	60	40	40	60	0	1600	2550	26	80	61	70	6	1450
2253	93	99	17	48	92	1747	2403	59	39	38	58	98	1597	2553	26	79	60	68	4	1447
2256	92	98	16	46	90	1744	2406	59	38	37	56	96	1594	2556	25	78	58	66	2	1444
2259	92	96	14	45	88	1741	2409	58	36	35	55	94	1591	2559	24	76	57	65	1	1441
2262	91	95	12	43	86	1738	2412	57	35	34	53	92	1588	2562	24	75	55	63	99	1438
2265	90	94	11	41	84	1735	2415	57	34	32	51	91	1585	2565	23	74	53	61	97	1435
2268	90	93	9	39	82	1732	2418	56	33	31	49	89	1582	2568	22	73	52	59	95	1432
2271	89	92	8	37	81	1729	2421	55	32	29	47	87	1579	2571	22	72	50	57	93	1429
2274	88	90	6	36	79	1726	2424	55	30	27	46	85	1576	2574	21	70	49	56	91	1426
2277	88	89	5	34	77	1723	2427	54	29	26	44	83	1573	2577	20	69	47	54	89	1423
2280	87	88	3	32	75	1720	2430	53	28	24	42	81	1570	2580	20	68	46	52	88	1420
2283	86	87	1	30	73	1717	2433	53	27	23	40	79	1567	2583	19	67	44	50	86	1417
2286	86	86	0	28	71	1714	2436	52	26	21	38	78	1564	2586	18	66	42	48	84	1414
2289	85	84	98	27	69	1711	2439	51	24	20	37	76	1561	2589	17	64	41	47	82	1411
2292	84	83	97	25	68	1708	2442	51	23	18	35	74	1558	2592	17	63	39	45	80	1408
2295	84	82	95	23	66	1705	2445	50	22	16	33	72	1555	2595	16	62	38	43	78	1405
2298	83	81	94	21	64	1702	2448	49	21	15	31	70	1552	2598	15	61	36	41	76	1402
2301	82	80	92	19	62	1699	2451	49	20	13	29	68	1549	2601	15	60	34	39	74	1399
2304	82	78	90	18	60	1696	2454	48	18	12	28	66	1546	2604	14	58	33	38	72	1396
2307	81	77	89	16	58	1693	2457	47	17	10	26	64	1543	2607	13	57	31	36	71	1393
2310	80	76	87	14	56	1690	2460	46	16	8	24	62	1540	2610	13	56	30	34	69	1390
2313	80	75	86	12	54	1687	2463	46	15	7	22	61	1537	2613	12	55	28	32	67	1387
2316	79	74	84	10	52	1684	2466	45	14	5	20	59	1534	2616	11	54	27	30	65	1384
2319	78	72	83	9	51	1681	2469	44	12	4	19	57	1531	2619	11	52	25	29	63	1381
2322	78	71	81	7	49	1678	2472	44	11	2	17	55	1528	2622	10	51	23	27	61	1378
2325	77	70	79	5	47	1675	2475	43	10	1	15	53	1525	2625	9	50	22	25	59	1375
2328	76	69	78	3	45	1672	2478	42	9	99	13	51	1522	2628	9	49	20	23	58	1372
2331	76	68	76	1	43	1669	2481	42	8	97	11	49	1519	2631	8	48	19	21	56	1369
2334	75	66	75	0	41	1666	2484	41	6	96	10	48	1516	2634	7	46	17	20	54	1366
2337	74	65	73	98	39	1663	2487	40	5	94	8	46	1513	2637	7	45	16	18	52	1363
2340	74	64	72	96	38	1660	2490	40	4	93	6	44	1510	2640	6	44	14	16	50	1360
2343	73	63	70	94	36	1657	2493	39	3	91	4	42	1507	2643	5	43	12	14	48	1357
2346	72	62	68	92	34	1654	2496	38	2	90	2	40	1504	2646	5	42	11	12	46	1354
2349	71	60	67	91	32	1651	2499	38	0	88	1	38	1501	2649	4	40	9	11	44	1351
2352	71	59	65	89	30	1648	2502	37	99	86	99	36	1498	2652	3	39	8	9	42	1348
2355	70	58	64	87	28	1645	2505	36	98	85	97	34	1495	2655	3	38	6	7	41	1345
2358	69	57	62	85	26	1642	2508	36	97	83	95	32	1492	2658	2	37	5	5	39	1342
2361	69	56	60	83	24	1639	2511	35	96	82	93	31	1489	2661	1	36	3	3	37	1339
2364	68	54	59	82	22	1636	2514	34	94	80	92	29	1486	2664	1	34	1	2	35	1336
2367	67	53	57	80	21	1633	2517	34	93	79	90	27	1483	2667	0	33	0	0	33	1333
2370	67	52	56	78	19	1630	2520	33	92	77	88	25	1480	2670	99	32	98	98	31	1330
2373	66	51	54	76	17	1627	2523	32	91	75	86	23	1477	2673	99	31	97	96	29	1327
2376	65	50	53	74	15	1624	2526	32	90	74	84	21	1474	2676	98	30	95	94	28	1324
2379	65	48	51	73	13	1621	2529	31	88	72	83	19	1471	2679	97	28	94	93	26	1321
2382	64	47	49	71	11	1618	2532	30	87	71	81	18	1468	2682	97	27	92	91	24	1318
2385	63	46	48	69	9	1615	2535	30	86	69	79	16	1465	2685	96	26	90	89	22	1315
2388	63	45	46	67	8	1612	2538	29	85	68	77	14	1462	2688	95	25	89	87	20	1312
2391	62	44	45	65	6	1609	2541	28	84	66	75	12	1459	2691	95	24	87	85	18	1309
2394	61	42	43	64	4	1606	2544	28	82	64	74	10	1456	2694	94	22	86	84	16	1306
2397	61	41	42	62	2	1603	2547	27	81	63	72	8	1453	2697	93	21	84	82	14	1303
2400	60	40	40	60	0	1600	2550	26	80	61	70	6	1450	2700	92	20	82	80	12	1300

INTERPOLATION TABLES.

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TABLE II. ARGUMENT $\Delta'' + \Delta'$

Positive arguments on the left. Negative arguments on the right.

30 92 20 82 80 12 1300	2850 59 60 4 90 19 1150	3000 25 0 25 0 25 1000
33 92 19 81 78 11 1297	2853 58 59 2 88 17 1147	3003 24 99 23 98 23 997
36 91 18 79 76 9 1294	2856 57 58 1 86 15 1144	3006 24 98 22 96 21 994
39 90 16 78 75 7 1291	2859 57 56 99 85 13 1141	3009 23 96 20 95 19 991
12 90 15 76 73 5 1288	2862 56 55 97 83 11 1138	3012 22 95 19 93 18 988
15 89 14 75 71 3 1285	2865 55 54 96 81 9 1135	3015 22 94 17 91 16 985
18 88 13 73 69 1 1282	2868 55 53 94 79 8 1132	3018 21 93 16 89 14 982
21 88 12 71 67 99 1279	2871 54 52 93 77 6 1129	3021 20 92 14 87 12 979
24 87 10 70 66 98 1276	2874 53 50 91 76 4 1126	3024 20 90 12 86 10 976
27 86 9 68 64 96 1273	2877 53 49 90 74 2 1123	3027 19 89 11 84 8 973
30 86 8 67 62 94 1270	2880 52 48 88 72 0 1120	3030 18 88 9 82 6 970
33 85 7 65 60 92 1267	2883 51 47 86 70 98 1117	3033 18 87 8 80 4 967
36 84 6 64 58 90 1264	2886 51 46 85 68 96 1114	3036 17 86 6 78 2 964
39 84 4 62 57 88 1261	2889 50 44 83 67 94 1111	3039 16 84 5 77 1 961
42 83 3 60 55 86 1258	2892 49 43 82 65 92 1108	3042 16 83 3 75 99 958
45 82 2 59 53 84 1255	2895 49 42 80 63 91 1105	3045 15 82 1 73 97 955
48 82 1 57 51 82 1252	2898 48 41 79 61 89 1102	3048 14 81 0 71 95 952
51 81 0 56 49 81 1249	2901 47 40 77 59 87 1099	3051 14 80 98 69 93 949
54 80 98 54 48 79 1246	2904 47 38 75 58 85 1096	3054 13 78 97 68 91 946
57 80 97 53 46 77 1243	2907 46 37 74 56 83 1093	3057 12 77 95 66 89 943
50 79 96 51 44 75 1240	2910 45 36 72 54 81 1090	3060 12 76 94 64 88 940
53 78 95 49 42 73 1237	2913 45 35 71 52 79 1087	3063 11 75 92 62 86 937
56 78 94 48 40 71 1234	2916 44 34 69 50 78 1084	3066 10 74 90 60 84 934
59 77 92 46 39 69 1231	2919 43 32 68 49 76 1081	3069 9 72 89 59 82 931
72 76 91 45 37 68 1228	2922 43 31 66 47 74 1078	3072 9 71 87 57 80 928
75 76 90 43 35 66 1225	2925 42 30 64 45 72 1075	3075 8 70 86 55 78 925
78 75 89 42 33 64 1222	2928 41 29 63 43 70 1072	3078 7 69 84 53 76 922
81 74 88 40 31 62 1219	2931 41 28 61 41 68 1069	3081 7 68 82 51 74 919
84 74 86 38 30 60 1216	2934 40 26 60 40 66 1066	3084 6 66 81 50 72 916
87 73 85 37 28 58 1213	2937 39 25 58 38 64 1063	3087 5 65 79 48 71 913
90 72 84 35 26 56 1210	2940 38 24 56 36 62 1060	3090 5 64 78 46 69 910
93 72 83 34 24 54 1207	2943 38 23 55 34 61 1057	3093 4 63 76 44 67 907
96 71 82 32 22 52 1204	2946 37 22 53 32 59 1054	3096 3 62 75 42 65 904
99 70 80 31 21 51 1201	2949 36 20 52 31 57 1051	3099 3 60 73 41 63 901
32 70 79 29 19 49 1198	2952 36 19 50 29 55 1048	3102 2 59 71 39 61 898
05 69 78 27 17 47 1195	2955 35 18 49 27 53 1045	3105 1 58 70 37 59 895
08 68 77 26 15 45 1192	2958 34 17 47 25 51 1042	3108 1 57 68 35 58 892
11 68 76 24 13 43 1189	2961 34 16 45 23 49 1039	3111 0 56 67 33 56 889
14 67 74 23 12 41 1186	2964 33 14 44 22 48 1036	3114 99 54 65 32 54 886
17 66 73 21 10 39 1183	2967 32 13 42 20 46 1033	3117 99 53 64 30 52 883
20 66 72 20 8 38 1180	2970 32 12 41 18 44 1030	3120 98 52 62 28 50 880
23 65 71 18 6 36 1177	2973 31 11 39 16 42 1027	3123 97 51 60 26 48 877
26 64 70 16 4 34 1174	2976 30 10 38 14 40 1024	3126 97 50 59 24 46 874
29 63 68 15 3 32 1171	2979 30 8 36 13 38 1021	3129 96 48 57 23 44 871
32 63 67 13 1 30 1168	2982 29 7 34 11 36 1018	3132 95 47 56 21 42 868
35 62 66 12 99 28 1165	2985 28 6 33 9 34 1015	3135 95 46 54 19 41 865
38 61 65 10 97 26 1162	2988 28 5 31 7 32 1012	3138 94 45 53 17 39 862
41 61 64 8 95 24 1159	2991 27 4 30 5 31 1009	3141 93 44 51 15 37 859
44 60 62 7 94 22 1156	2994 26 2 28 4 29 1006	3144 93 42 49 14 35 856
47 59 61 5 92 21 1153	2997 26 1 27 2 27 1003	3147 92 41 48 12 33 853
50 59 60 4 90 19 1150	3000 25 0 25 0 25 1000	3150 91 40 46 10 31 850

INTERPOLATION TABLES.

TABLE II. ARGUMENT $\Delta_0 + \Delta_1$

Positive arguments on the left. Negative arguments on the right.

3150	91	40	46	10	31	850	3300	58	80	68	20	38	700	3450	24	20	89	30	44	550
3153	91	39	45	8	29	847	3303	57	79	66	18	36	697	3453	23	19	87	28	42	547
3156	90	38	43	6	28	844	3306	56	78	64	16	34	694	3456	22	18	86	26	40	544
3159	89	36	42	5	26	841	3309	55	76	63	15	32	691	3459	22	16	84	25	38	541
3162	89	35	40	3	24	838	3312	55	75	61	13	30	688	3462	21	15	82	23	36	538
3165	88	34	38	1	22	835	3315	54	74	60	11	28	685	3465	20	14	81	21	34	535
3168	87	33	37	99	20	832	3318	53	73	58	9	26	682	3468	20	13	79	19	32	532
3171	87	32	35	97	18	829	3321	53	72	56	7	24	679	3471	19	12	78	17	31	529
3174	86	30	34	96	16	826	3324	52	70	55	6	22	676	3474	18	10	76	16	29	526
3177	85	29	32	94	14	823	3327	51	69	53	4	21	673	3477	18	9	75	14	27	523
3180	84	28	30	92	12	820	3330	51	68	52	2	19	670	3480	17	8	73	12	25	520
3183	84	27	29	90	11	817	3333	50	67	50	0	17	667	3483	16	7	71	10	23	517
3186	83	26	27	88	9	814	3336	49	66	49	98	15	664	3486	16	6	70	8	21	514
3189	82	24	26	87	7	811	3339	49	64	47	97	13	661	3489	15	4	68	7	19	511
3192	82	23	24	85	5	808	3342	48	63	45	95	11	658	3492	14	3	67	5	18	508
3195	81	22	23	83	3	805	3345	47	62	44	93	9	655	3495	14	2	65	3	16	505
3198	80	21	21	81	1	802	3348	47	61	42	91	8	652	3498	13	1	64	1	14	502
3201	80	20	19	79	99	799	3351	46	60	41	89	6	649	3501	12	0	62	99	12	499
3204	79	18	18	78	98	796	3354	45	58	39	88	4	646	3504	12	98	60	98	10	496
3207	78	17	16	76	96	793	3357	45	57	38	86	2	643	3507	11	97	59	96	8	493
3210	78	16	15	74	94	790	3360	44	56	36	84	0	640	3510	10	96	57	94	6	490
3213	77	15	13	72	92	787	3363	43	55	34	82	98	637	3513	10	95	56	92	4	487
3216	76	14	12	70	90	784	3366	43	54	33	80	96	634	3516	9	94	54	90	2	484
3219	76	12	10	69	88	781	3369	42	52	31	79	94	631	3519	8	92	53	89	1	481
3222	75	11	8	67	86	778	3372	41	51	30	77	92	628	3522	8	91	51	87	99	478
3225	74	10	7	65	84	775	3375	41	50	28	75	91	625	3525	7	90	49	85	97	475
3228	74	9	5	63	82	772	3378	40	49	27	73	89	622	3528	6	89	48	83	95	472
3231	73	8	4	61	81	769	3381	39	48	25	71	87	619	3531	6	88	46	81	93	469
3234	72	6	2	60	79	766	3384	39	46	23	70	85	616	3534	5	86	45	80	91	466
3237	72	5	1	58	77	763	3387	38	45	22	68	83	613	3537	4	85	43	78	89	463
3240	71	4	99	56	75	760	3390	37	44	20	66	81	610	3540	4	84	42	76	88	460
3243	70	3	97	54	73	757	3393	37	43	19	64	79	607	3543	3	83	40	74	86	457
3246	70	2	96	52	71	754	3396	36	42	17	62	78	604	3546	2	82	38	72	84	454
3249	69	0	94	51	69	751	3399	35	40	16	61	76	601	3549	1	80	37	71	82	451
3252	68	99	93	49	68	748	3402	35	39	14	59	74	598	3552	1	79	35	69	80	448
3255	68	98	91	47	66	745	3405	34	38	12	57	72	595	3555	0	78	34	67	78	445
3258	67	97	90	45	64	742	3408	33	37	11	55	70	592	3558	99	77	32	65	76	442
3261	66	96	88	43	62	739	3411	33	36	9	53	68	589	3561	99	76	30	63	74	439
3264	66	94	86	42	60	736	3414	32	34	8	52	66	586	3564	98	74	29	62	72	436
3267	65	93	85	40	58	733	3417	31	33	6	50	64	583	3567	97	73	27	60	71	433
3270	64	92	83	38	56	730	3420	30	32	4	48	62	580	3570	97	72	26	58	69	430
3273	64	91	82	36	54	727	3423	30	31	3	46	61	577	3573	96	71	24	56	67	427
3276	63	90	80	34	52	724	3426	29	30	1	44	59	574	3576	95	70	23	54	65	424
3279	62	88	79	33	51	721	3429	28	28	0	43	57	571	3579	95	68	21	53	63	421
3282	62	87	77	31	49	718	3432	28	27	98	41	55	568	3582	94	67	19	51	61	418
3285	61	86	75	29	47	715	3435	27	26	97	39	53	565	3585	93	66	18	49	59	415
3288	60	85	74	27	45	712	3438	26	25	95	37	51	562	3588	93	65	16	47	58	412
3291	60	84	72	25	43	709	3441	26	24	93	35	49	559	3591	92	64	15	45	56	409
3294	59	82	71	24	41	706	3444	25	22	92	34	48	556	3594	91	62	13	44	54	406
3297	58	81	69	22	39	703	3447	24	21	90	32	46	553	3597	91	61	12	42	52	403
3300	58	80	68	20	38	700	3450	24	20	89	30	44	550	3600	90	60	10	40	50	400

INTERPOLATION TABLES.

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TABLE II. ARGUMENT $\Delta_0'' + \Delta_1''$

Positive arguments on the left. Negative arguments on the right.

600	90	60	10	40	50	400	3750	56	0	31	50	56	250	3900	22	40	52	60	62	100
603	89	59	8	38	48	397	3753	56	99	30	48	54	247	3903	22	39	51	58	61	97
606	89	58	7	36	46	394	3756	55	98	28	46	52	244	3906	21	38	49	56	59	94
609	88	56	5	35	44	391	3759	54	96	27	45	51	241	3909	20	36	48	55	57	91
612	87	55	4	33	42	388	3762	54	95	25	43	49	238	3912	20	35	46	53	55	88
615	87	54	2	31	41	385	3765	53	94	23	41	47	235	3915	19	34	45	51	53	85
618	86	53	1	29	39	382	3768	52	93	22	39	45	232	3918	18	33	43	49	51	82
621	85	52	99	27	37	379	3771	52	92	20	37	43	229	3921	18	32	41	47	49	79
624	85	50	97	26	35	376	3774	51	90	19	36	41	226	3924	17	30	40	46	48	76
627	84	49	96	24	33	373	3777	50	89	17	34	39	223	3927	16	29	38	44	46	73
630	83	48	94	22	31	370	3780	50	88	16	32	38	220	3930	16	28	37	42	44	70
633	83	47	93	20	29	367	3783	49	87	14	30	36	217	3933	15	27	35	40	42	67
636	82	46	91	18	28	364	3786	48	86	12	28	34	214	3936	14	26	34	38	40	64
639	81	44	90	17	26	361	3789	47	84	11	27	32	211	3939	14	24	32	37	38	61
642	81	43	88	15	24	358	3792	47	83	9	25	30	208	3942	13	23	30	35	36	58
645	80	42	86	13	22	355	3795	46	82	8	23	28	205	3945	12	22	29	33	34	55
648	79	41	85	11	20	352	3798	45	81	6	21	26	202	3948	12	21	27	31	32	52
651	79	40	83	9	18	349	3801	45	80	4	19	24	199	3951	11	20	26	29	31	49
654	78	38	82	8	16	346	3804	44	78	3	18	22	196	3954	10	18	24	28	29	46
657	77	37	80	6	14	343	3807	43	77	1	16	21	193	3957	10	17	23	26	27	43
660	76	36	78	4	12	340	3810	43	76	0	14	19	190	3960	9	16	21	24	25	40
663	76	35	77	2	11	337	3813	42	75	98	12	17	187	3963	8	15	19	22	23	37
666	75	34	75	0	9	334	3816	41	74	97	10	15	184	3966	8	14	18	20	21	34
669	74	32	74	99	7	331	3819	41	72	95	9	13	181	3969	7	12	16	19	19	31
672	74	31	72	97	5	328	3822	40	71	93	7	11	178	3972	6	11	15	17	18	28
675	73	30	71	95	3	325	3825	39	70	92	5	9	175	3975	6	10	13	15	16	25
678	72	29	69	93	1	322	3828	39	69	90	3	8	172	3978	5	9	12	13	14	22
681	72	28	67	91	99	319	3831	38	68	89	1	6	169	3981	4	8	10	11	12	19
684	71	26	66	90	98	316	3834	37	66	87	0	4	166	3984	4	6	8	10	10	16
687	70	25	64	88	96	313	3837	37	65	86	98	2	163	3987	3	5	7	8	8	13
690	70	24	63	86	94	310	3840	36	64	84	96	0	160	3990	2	4	5	6	6	10
693	69	23	61	84	92	307	3843	35	63	82	94	98	157	3993	2	3	4	4	4	7
696	68	22	60	82	90	304	3846	35	62	81	92	96	154	3996	1	2	2	2	2	4
699	68	20	58	81	88	301	3849	34	60	79	91	94	151	3999	0	0	1	1	1	1
702	67	19	56	79	86	298	3852	33	59	78	89	92	148							
705	66	18	55	77	84	295	3855	33	58	76	87	91	145							
708	66	17	53	75	82	292	3858	32	57	75	85	89	142							
711	65	16	52	73	81	289	3861	31	56	73	83	87	139							
714	64	14	50	72	79	286	3864	31	54	71	82	85	136							
717	64	13	49	70	77	283	3867	30	53	70	80	83	133							
720	63	12	47	68	75	280	3870	29	52	68	78	81	130							
723	62	11	45	66	73	277	3873	29	51	67	76	79	127							
726	62	10	44	64	71	274	3876	28	50	65	74	78	124							
729	61	8	42	63	69	271	3879	27	48	64	73	76	121							
732	60	7	41	61	68	268	3882	27	47	62	71	74	118							
735	60	6	39	59	66	265	3885	26	46	60	69	72	115							
738	59	5	38	57	64	262	3888	25	45	59	67	70	112							
741	58	4	36	55	62	259	3891	25	44	57	65	68	109							
744	58	2	34	54	60	256	3894	24	42	56	64	66	106							
747	57	1	33	52	58	253	3897	23	41	54	62	64	103							
750	56	0	31	50	56	250	3900	22	40	52	60	62	100							

INTERPOLATION TABLES.

TABLE III. ARGUMENT Δ'''

If the argument is negative read the columns in the reverse order.

0	0	0	0	0	0	0	0	0	0	500	30	40	35	20	0	80	65	60	70
10	1	1	1	0	0	0	99	99	99	510	31	41	36	20	0	80	64	59	69
20	1	2	1	1	0	99	99	98	99	520	31	42	36	21	0	79	64	58	69
30	2	2	2	1	0	99	98	98	98	530	32	42	37	21	0	79	63	58	68
40	2	3	3	2	0	98	97	97	98	540	32	43	38	22	0	78	62	57	68
50	3	4	4	2	0	98	96	96	97	550	33	44	38	22	0	78	62	56	67
60	4	5	4	2	0	98	96	95	96	560	34	45	39	22	0	78	61	55	66
70	4	6	5	3	0	97	95	94	96	570	34	46	40	23	0	77	60	54	66
80	5	6	6	3	0	97	94	94	95	580	35	46	41	23	0	77	59	54	65
90	5	7	6	4	0	96	94	93	95	590	35	47	41	24	0	76	59	53	65
100	6	8	7	4	0	96	93	92	94	600	36	48	42	24	0	76	58	52	64
110	7	9	8	4	0	96	92	91	93	610	37	49	43	24	0	76	57	51	63
120	7	10	8	5	0	95	92	90	93	620	37	50	43	25	0	75	57	50	63
130	8	10	9	5	0	95	91	90	92	630	38	50	44	25	0	75	56	50	62
140	8	11	10	6	0	94	90	89	92	640	38	51	45	26	0	74	55	49	62
150	9	12	10	6	0	94	90	88	91	650	39	52	46	26	0	74	54	48	61
160	10	13	11	6	0	94	89	87	90	660	40	53	46	26	0	74	54	47	60
170	10	14	12	7	0	93	88	86	90	670	40	54	47	27	0	73	53	46	60
180	11	14	13	7	0	93	87	86	89	680	41	54	48	27	0	73	52	46	59
190	11	15	13	8	0	92	87	85	89	690	41	55	48	28	0	72	52	45	59
200	12	16	14	8	0	92	86	84	88	700	42	56	49	28	0	72	51	44	58
210	13	17	15	8	0	92	85	83	87	710	43	57	50	28	0	72	50	43	57
220	13	18	15	9	0	91	85	82	87	720	43	58	50	29	0	71	50	42	57
230	14	18	16	9	0	91	84	82	86	730	44	58	51	29	0	71	49	42	56
240	14	19	17	10	0	90	83	81	86	740	44	59	52	30	0	70	48	41	56
250	15	20	18	10	0	90	82	80	85	750	45	60	52	30	0	70	48	40	55
260	16	21	18	10	0	90	82	79	84	760	46	61	53	30	0	70	47	39	54
270	16	22	19	11	0	89	81	78	84	770	46	62	54	31	0	69	46	38	54
280	17	22	20	11	0	89	80	78	83	780	47	62	55	31	0	69	45	38	53
290	17	23	20	12	0	88	80	77	83	790	47	63	55	32	0	68	45	37	53
300	18	24	21	12	0	88	79	76	82	800	48	64	56	32	0	68	44	36	52
310	19	25	22	12	0	88	78	75	81	810	49	65	57	32	0	68	43	35	51
320	19	26	22	13	0	87	78	74	81	820	49	66	57	33	0	67	43	34	51
330	20	26	23	13	0	87	77	74	80	830	50	66	58	33	0	67	42	34	50
340	20	27	24	14	0	86	76	73	80	840	50	67	59	34	0	66	41	33	50
350	21	28	24	14	0	86	76	72	79	850	51	68	60	34	0	66	40	32	49
360	22	29	25	15	0	86	75	71	78	860	52	69	60	34	0	66	40	31	48
370	22	30	26	15	0	85	74	70	78	870	52	70	61	35	0	65	39	30	48
380	23	30	27	15	0	85	73	70	77	880	53	70	62	35	0	65	38	30	47
390	23	31	27	16	0	84	73	69	77	890	53	71	62	36	0	64	38	29	47
400	24	32	28	16	0	84	72	68	76	900	54	72	63	36	0	64	37	28	46
410	25	33	29	16	0	84	71	67	75	910	55	73	64	36	0	64	36	27	45
420	25	34	29	17	0	83	71	66	75	920	55	74	64	37	0	63	36	26	45
430	26	34	30	17	0	83	70	66	74	930	56	74	65	37	0	63	35	26	44
440	26	35	31	18	0	82	69	65	74	940	56	75	66	38	0	62	34	25	44
450	27	36	32	18	0	82	68	64	73	950	57	76	66	38	0	62	34	24	43
460	28	37	32	18	0	82	68	63	72	960	58	77	67	38	0	62	33	23	42
470	28	38	33	19	0	81	67	62	72	970	58	78	68	39	0	61	32	22	42
480	29	38	34	19	0	81	66	62	71	980	59	78	69	39	0	61	31	22	41
490	29	39	34	20	0	80	66	61	71	990	59	79	69	40	0	60	31	21	41

TABLE III. ARGUMENT Δ'''

If the argument is negative read the columns in the reverse order.

1000	60	80	70	40	0	60	30	20	40	1500	90	20	5	60	0	40	95	80	10
1010	61	81	71	40	0	60	29	19	39	1510	91	21	6	60	0	40	94	79	9
1020	61	82	71	41	0	59	29	18	39	1520	91	22	6	61	0	39	94	78	9
1030	62	82	72	41	0	59	28	18	38	1530	92	22	7	61	0	39	93	78	8
1040	62	83	73	42	0	58	27	17	38	1540	92	23	8	62	0	38	92	77	8
1050	63	84	74	42	0	58	26	16	37	1550	93	24	8	62	0	38	92	76	7
1060	64	85	74	42	0	58	26	15	36	1560	94	25	9	62	0	38	91	75	6
1070	64	86	75	43	0	57	25	14	36	1570	94	26	10	63	0	37	90	74	6
1080	65	86	76	43	0	57	24	14	35	1580	95	26	11	63	0	37	89	74	5
1090	65	87	76	44	0	56	24	13	35	1590	95	27	11	64	0	36	89	73	5
1100	66	88	77	44	0	56	23	12	34	1600	96	28	12	64	0	36	88	72	4
1110	67	89	78	44	0	56	22	11	33	1610	97	29	13	64	0	36	87	71	3
1120	67	90	78	45	0	55	22	10	33	1620	97	30	13	65	0	35	87	70	3
1130	68	90	79	45	0	55	21	10	32	1630	98	30	14	65	0	35	86	70	2
1140	68	91	80	46	0	54	20	9	32	1640	98	31	15	66	0	34	85	69	2
1150	69	92	80	46	0	54	20	8	31	1650	99	32	16	66	0	34	84	68	1
1160	70	93	81	46	0	54	19	7	30	1660	0	33	16	66	0	34	84	67	0
1170	70	94	82	47	0	53	18	6	30	1670	0	34	17	67	0	33	83	66	0
1180	71	94	83	47	0	53	17	6	29	1680	1	34	18	67	0	33	82	66	99
1190	71	95	83	48	0	52	17	5	29	1690	1	35	18	68	0	32	82	65	99
1200	72	96	84	48	0	52	16	4	28	1700	2	36	19	68	0	32	81	64	98
1210	73	97	85	48	0	52	15	3	27	1710	3	37	20	68	0	32	80	63	97
1220	73	98	85	49	0	51	15	2	27	1720	3	38	20	69	0	31	80	62	97
1230	74	98	86	49	0	51	14	2	26	1730	4	38	21	69	0	31	79	62	96
1240	74	99	87	50	0	50	13	1	26	1740	4	39	22	70	0	30	78	61	96
1250	75	0	88	50	0	50	12	0	25	1750	5	40	22	70	0	30	78	60	95
1260	76	1	88	50	0	50	12	99	24	1760	6	41	23	70	0	30	77	59	94
1270	76	2	89	51	0	49	11	98	24	1770	6	42	24	71	0	29	76	58	94
1280	77	2	90	51	0	49	10	98	23	1780	7	42	25	71	0	29	75	58	93
1290	77	3	90	52	0	48	10	97	23	1790	7	43	25	72	0	28	75	57	93
1300	78	4	91	52	0	48	9	96	22	1800	8	44	26	72	0	28	74	56	92
1310	79	5	92	52	0	48	8	95	21	1810	9	45	27	72	0	28	73	55	91
1320	79	6	92	53	0	47	8	94	21	1820	9	46	27	73	0	27	73	54	91
1330	80	6	93	53	0	47	7	94	20	1830	10	46	28	73	0	27	72	54	90
1340	80	7	94	54	0	46	6	93	20	1840	10	47	29	74	0	26	71	53	90
1350	81	8	94	54	0	46	6	92	19	1850	11	48	30	74	0	26	70	52	89
1360	82	9	95	54	0	46	5	91	18	1860	12	49	30	74	0	26	70	51	88
1370	82	10	96	55	0	45	4	90	18	1870	12	50	31	75	0	25	69	50	88
1380	83	10	97	55	0	45	3	90	17	1880	13	50	32	75	0	25	68	50	87
1390	83	11	97	56	0	44	3	89	17	1890	13	51	32	76	0	24	68	49	87
1400	84	12	98	56	0	44	2	88	16	1900	14	52	33	76	0	24	67	48	86
1410	85	13	99	56	0	44	1	87	15	1910	15	53	34	76	0	24	66	47	85
1420	85	14	99	57	0	43	1	86	15	1920	15	54	34	77	0	23	66	46	85
1430	86	14	0	57	0	43	0	86	14	1930	16	54	35	77	0	23	65	46	84
1440	86	15	1	58	0	42	99	85	14	1940	16	55	36	78	0	22	64	45	84
1450	87	16	2	58	0	42	98	84	13	1950	17	56	36	78	0	22	64	44	83
1460	88	17	2	58	0	42	98	83	12	1960	18	57	37	78	0	22	63	43	82
1470	88	18	3	59	0	41	97	82	12	1970	18	58	38	79	0	21	62	42	82
1480	89	18	4	59	0	41	96	82	11	1980	19	58	39	79	0	21	62	42	81
1490	89	19	4	60	0	40	96	81	11	1990	19	59	39	80	0	20	61	41	81

INTERPOLATION TABLES.

TABLE III. ARGUMENT Δ'''

If the argument is negative read the columns in the reverse order.

2000	20	60	40	80	0	20	60	40	80	2500	50	0	75	0	0	0	25	0	50
2010	21	61	41	80	0	20	59	39	79	2510	51	1	76	0	0	0	24	99	49
2020	21	62	41	81	0	19	59	38	79	2520	51	2	76	1	0	99	24	98	49
2030	22	62	42	81	0	19	58	38	78	2530	52	2	77	1	0	99	23	98	48
2040	22	63	43	82	0	18	57	37	78	2540	52	3	78	2	0	98	22	97	48
2050	23	64	44	82	0	18	56	36	77	2550	53	4	78	2	0	98	22	96	47
2060	24	65	44	82	0	18	56	35	76	2560	54	5	79	2	0	98	21	95	46
2070	24	66	45	83	0	17	55	34	76	2570	54	6	80	3	0	97	20	94	46
2080	25	66	46	83	0	17	54	34	75	2580	55	6	81	3	0	97	19	94	45
2090	25	67	46	84	0	16	54	33	75	2590	55	7	81	4	0	96	19	93	45
2100	26	68	47	84	0	16	53	32	74	2600	56	8	82	4	0	96	18	92	44
2110	27	69	48	84	0	16	52	31	73	2610	57	9	83	4	0	96	17	91	43
2120	27	70	48	85	0	15	52	30	73	2620	57	10	83	5	0	95	17	90	43
2130	28	70	49	85	0	15	51	30	72	2630	58	10	84	5	0	95	16	90	42
2140	28	71	50	86	0	14	50	29	72	2640	58	11	85	6	0	94	15	89	42
2150	29	72	50	86	0	14	50	28	71	2650	59	12	86	6	0	94	14	88	41
2160	30	73	51	86	0	14	49	27	70	2660	60	13	86	6	0	94	14	87	40
2170	30	74	52	87	0	13	48	26	70	2670	60	14	87	7	0	93	13	86	40
2180	31	74	53	87	0	13	47	26	69	2680	61	14	88	7	0	93	12	86	39
2190	31	75	53	88	0	12	47	25	69	2690	61	15	88	8	0	92	12	85	39
2200	32	76	54	88	0	12	46	24	68	2700	62	16	89	8	0	92	11	84	38
2210	33	77	55	88	0	12	45	23	67	2710	63	17	90	8	0	92	10	83	37
2220	33	78	55	89	0	11	45	22	67	2720	63	18	90	9	0	91	10	82	37
2230	34	78	56	89	0	11	44	22	66	2730	64	18	91	9	0	91	9	82	36
2240	34	79	57	90	0	10	43	21	66	2740	64	19	92	10	0	90	8	81	36
2250	35	80	58	90	0	10	42	20	65	2750	65	20	92	10	0	90	8	80	35
2260	36	81	58	90	0	10	42	19	64	2760	66	21	93	10	0	90	7	79	34
2270	36	82	59	91	0	9	41	18	64	2770	66	22	94	11	0	89	6	78	34
2280	37	82	60	91	0	9	40	18	63	2780	67	22	95	11	0	89	5	78	33
2290	37	83	60	92	0	8	40	17	63	2790	67	23	95	12	0	88	5	77	33
2300	38	84	61	92	0	8	39	16	62	2800	68	24	96	12	0	88	4	76	32
2310	39	85	62	92	0	8	38	15	61	2810	69	25	97	12	0	88	3	75	31
2320	39	86	62	93	0	7	38	14	61	2820	69	26	97	13	0	87	3	74	31
2330	40	86	63	93	0	7	37	14	60	2830	70	26	98	13	0	87	2	74	30
2340	40	87	64	94	0	6	36	13	60	2840	70	27	99	14	0	86	1	73	30
2350	41	88	64	94	0	6	36	12	59	2850	71	28	0	14	0	86	0	72	29
2360	42	89	65	94	0	6	35	11	58	2860	72	29	0	14	0	86	0	71	28
2370	42	90	66	95	0	5	34	10	58	2870	72	30	1	15	0	85	99	70	28
2380	43	90	67	95	0	5	33	10	57	2880	73	30	2	15	0	85	98	70	27
2390	43	91	67	96	0	4	33	9	57	2890	73	31	2	16	0	84	98	69	27
2400	44	92	68	96	0	4	32	8	56	2900	74	32	3	16	0	84	97	68	26
2410	45	93	69	96	0	4	31	7	55	2910	75	33	4	16	0	84	96	67	25
2420	45	94	69	97	0	3	31	6	55	2920	75	34	4	17	0	83	96	66	25
2430	46	94	70	97	0	3	30	6	54	2930	76	34	5	17	0	83	95	66	24
2440	46	95	71	98	0	2	29	5	54	2940	76	35	6	18	0	82	94	65	24
2450	47	96	72	98	0	2	28	4	53	2950	77	36	6	18	0	82	94	64	23
2460	48	97	72	98	0	2	28	3	52	2960	78	37	7	18	0	82	93	63	22
2470	48	98	73	99	0	1	27	2	52	2970	78	38	8	19	0	81	92	62	22
2480	49	98	74	99	0	1	26	2	51	2980	79	38	9	19	0	81	91	62	21
2490	49	99	74	0	0	0	26	1	51	2990	79	39	9	20	0	80	91	61	21

INTERPOLATION TABLES.

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TABLE III. ARGUMENT Δ'''

If the argument is negative read the columns in the reverse order.

3000	80	40	10	20	0	80	90	60	20	3500	10	80	45	40	0	60	55	20	90
3010	81	41	11	20	0	80	89	59	19	3510	11	81	46	40	0	60	54	19	89
3020	81	42	11	21	0	79	89	58	19	3520	11	82	46	41	0	59	54	18	89
3030	82	42	12	21	0	79	88	58	18	3530	12	82	47	41	0	59	53	18	88
3040	82	43	13	22	0	78	87	57	18	3540	12	83	48	42	0	58	52	17	88
3050	83	44	14	22	0	78	86	56	17	3550	13	84	48	42	0	58	52	16	87
3060	84	45	14	22	0	78	86	55	16	3560	14	85	49	42	0	58	51	15	86
3070	84	46	15	23	0	77	85	54	16	3570	14	86	50	43	0	57	50	14	86
3080	85	46	16	23	0	77	84	54	15	3580	15	86	51	43	0	57	49	14	85
3090	85	47	16	24	0	76	84	53	15	3590	15	87	51	44	0	56	49	13	85
3100	86	48	17	24	0	76	83	52	14	3600	16	88	52	44	0	56	48	12	84
3110	87	49	18	24	0	76	82	51	13	3610	17	89	53	44	0	56	47	11	83
3120	87	50	18	25	0	75	82	50	13	3620	17	90	53	45	0	55	47	10	83
3130	88	50	19	25	0	75	81	50	12	3630	18	90	54	45	0	55	46	10	82
3140	88	51	20	26	0	74	80	49	12	3640	18	91	55	46	0	54	45	9	82
3150	89	52	20	26	0	74	80	48	11	3650	19	92	56	46	0	54	44	8	81
3160	90	53	21	26	0	74	79	47	10	3660	20	93	56	46	0	54	44	7	80
3170	90	54	22	27	0	73	78	46	10	3670	20	94	57	47	0	53	43	6	80
3180	91	54	23	27	0	73	77	46	9	3680	21	94	58	47	0	53	42	6	79
3190	91	55	23	28	0	72	77	45	9	3690	21	95	58	48	0	52	42	5	79
3200	92	56	24	28	0	72	76	44	8	3700	22	96	59	48	0	52	41	4	78
3210	93	57	25	28	0	72	75	43	7	3710	23	97	60	48	0	52	40	3	77
3220	93	58	25	29	0	71	75	42	7	3720	23	98	60	49	0	51	40	2	77
3230	94	58	26	29	0	71	74	42	6	3730	24	98	61	49	0	51	39	2	76
3240	94	59	27	30	0	70	73	41	6	3740	24	99	62	50	0	50	38	1	76
3250	95	60	28	30	0	70	72	40	5	3750	25	0	62	50	0	50	38	0	75
3260	96	61	28	30	0	70	72	39	4	3760	26	1	63	50	0	50	37	99	74
3270	96	62	29	31	0	69	71	38	4	3770	26	2	64	51	0	49	36	98	74
3280	97	62	30	31	0	69	70	38	3	3780	27	2	65	51	0	49	35	98	73
3290	97	63	30	32	0	68	70	37	3	3790	27	3	65	52	0	48	35	97	73
3300	98	64	31	32	0	68	69	36	2	3800	28	4	66	52	0	48	34	96	72
3310	99	65	32	32	0	68	68	35	1	3810	29	5	67	52	0	48	33	95	71
3320	99	66	32	33	0	67	68	34	1	3820	29	6	67	53	0	47	33	94	71
3330	0	66	33	33	0	67	67	34	0	3830	30	6	68	53	0	47	32	94	70
3340	0	67	34	34	0	66	66	33	0	3840	30	7	69	54	0	46	31	93	70
3350	1	68	34	34	0	66	66	32	99	3850	31	8	70	54	0	46	30	92	69
3360	2	69	35	34	0	66	65	31	98	3860	32	9	70	54	0	46	30	91	68
3370	2	70	36	35	0	65	64	30	98	3870	32	10	71	55	0	45	29	90	68
3380	3	70	37	35	0	65	63	30	97	3880	33	10	72	55	0	45	28	90	67
3390	3	71	37	36	0	64	63	29	97	3890	33	11	72	56	0	44	28	89	67
3400	4	72	38	36	0	64	62	28	96	3900	34	12	73	56	0	44	27	88	66
3410	5	73	39	36	0	64	61	27	95	3910	35	13	74	56	0	44	26	87	65
3420	5	74	39	37	0	63	61	26	95	3920	35	14	74	57	0	43	26	86	65
3430	6	74	40	37	0	63	60	26	94	3930	36	14	75	57	0	43	25	86	64
3440	6	75	41	38	0	62	59	25	94	3940	36	15	76	58	0	42	24	85	64
3450	7	76	42	38	0	62	58	24	93	3950	37	16	76	58	0	42	24	84	63
3460	8	77	42	38	0	62	58	23	92	3960	38	17	77	58	0	42	23	83	62
3470	8	78	43	39	0	61	57	22	92	3970	38	18	78	59	0	41	22	82	62
3480	9	78	44	39	0	61	56	22	91	3980	39	18	79	59	0	41	21	82	61
3490	9	79	44	40	0	60	56	21	91	3990	39	19	79	60	0	40	21	81	61

INTERPOLATION TABLES.

TABLE III. ARGUMENT Δ'''

If the argument is negative read the columns in the reverse order.

4000	40	20	80	60	0	40	20	80	60	4500	70	60	15	80	0	20	85	40	30
4010	41	21	81	60	0	40	19	79	59	4510	71	61	16	80	0	20	84	39	29
4020	41	22	81	61	0	39	19	78	59	4520	71	62	16	81	0	19	84	38	29
4030	42	22	82	61	0	39	18	78	58	4530	72	62	17	81	0	19	83	38	28
4040	42	23	83	62	0	38	17	77	58	4540	72	63	18	82	0	18	82	37	28
4050	43	24	84	62	0	38	16	76	57	4550	73	64	18	82	0	18	82	36	27
4060	44	25	84	62	0	38	16	75	56	4560	74	65	19	82	0	18	81	35	26
4070	44	26	85	63	0	37	15	74	56	4570	74	66	20	83	0	17	80	34	26
4080	45	26	86	63	0	37	14	74	55	4580	75	66	21	83	0	17	79	34	25
4090	45	27	86	64	0	36	14	73	55	4590	75	67	21	84	0	16	79	33	25
4100	46	28	87	64	0	36	13	72	54	4600	76	68	22	84	0	16	78	32	24
4110	47	29	88	64	0	36	12	71	53	4610	77	69	23	84	0	16	77	31	23
4120	47	30	88	65	0	35	12	70	53	4620	77	70	23	85	0	15	77	30	23
4130	48	30	89	65	0	35	11	70	52	4630	78	70	24	85	0	15	76	30	22
4140	48	31	90	66	0	34	10	69	52	4640	78	71	25	86	0	14	75	29	22
4150	49	32	90	66	0	34	10	68	51	4650	79	72	26	86	0	14	74	28	21
4160	50	33	91	66	0	34	9	67	50	4660	80	73	26	86	0	14	74	27	20
4170	50	34	92	67	0	33	8	66	50	4670	80	74	27	87	0	13	73	26	20
4180	51	34	93	67	0	33	7	66	49	4680	81	74	28	87	0	13	72	26	19
4190	51	35	93	68	0	32	7	65	49	4690	81	75	28	88	0	12	72	25	19
4200	52	36	94	68	0	32	6	64	48	4700	82	76	29	88	0	12	71	24	18
4210	53	37	95	68	0	32	5	63	47	4710	83	77	30	88	0	12	70	23	17
4220	53	38	95	69	0	31	5	62	47	4720	83	78	30	89	0	11	70	22	17
4230	54	38	96	69	0	31	4	62	46	4730	84	78	31	89	0	11	69	22	16
4240	54	39	97	70	0	30	3	61	46	4740	84	79	32	90	0	10	68	21	16
4250	55	40	98	70	0	30	2	60	45	4750	85	80	32	90	0	10	68	20	15
4260	56	41	98	70	0	30	2	59	44	4760	86	81	33	90	0	10	67	19	14
4270	56	42	99	71	0	29	1	58	44	4770	86	82	34	91	0	9	66	18	14
4280	57	42	0	71	0	29	0	58	43	4780	87	82	35	91	0	9	65	18	13
4290	57	43	0	72	0	28	0	57	43	4790	87	83	35	92	0	8	65	17	13
4300	58	44	1	72	0	28	99	56	42	4800	88	84	36	92	0	8	64	16	12
4310	59	45	2	72	0	28	98	55	41	4810	89	85	37	92	0	8	63	15	11
4320	59	46	2	73	0	27	98	54	41	4820	89	86	37	93	0	7	63	14	11
4330	60	46	3	73	0	27	97	54	40	4830	90	86	38	93	0	7	62	14	10
4340	60	47	4	74	0	26	96	53	40	4840	90	87	39	94	0	6	61	13	10
4350	61	48	4	74	0	26	96	52	39	4850	91	88	40	94	0	6	60	12	9
4360	62	49	5	74	0	26	95	51	38	4860	92	89	40	94	0	6	60	11	8
4370	62	50	6	75	0	25	94	50	38	4870	92	90	41	95	0	5	59	10	8
4380	63	50	7	75	0	25	93	50	37	4880	93	90	42	95	0	5	58	10	7
4390	63	51	7	76	0	24	93	49	37	4890	93	91	42	96	0	4	58	9	7
4400	64	52	8	76	0	24	92	48	36	4900	94	92	43	96	0	4	57	8	6
4410	65	53	9	76	0	24	91	47	35	4910	95	93	44	96	0	4	56	7	5
4420	65	54	9	77	0	23	91	46	35	4920	95	94	44	97	0	3	56	6	5
4430	66	54	10	77	0	23	90	46	34	4930	96	94	45	97	0	3	55	6	4
4440	66	55	11	78	0	22	89	45	34	4940	96	95	46	98	0	2	54	5	4
4450	67	56	12	78	0	22	88	44	33	4950	97	96	46	98	0	2	54	4	3
4460	68	57	12	78	0	22	88	43	32	4960	98	97	47	98	0	2	53	3	2
4470	68	58	13	79	0	21	87	42	32	4970	98	98	48	99	0	1	52	2	2
4480	69	58	14	79	0	21	86	42	31	4980	99	98	49	99	0	1	51	2	1
4490	69	59	14	80	0	20	86	41	31	4990	99	99	49	0	0	0	51	1	1

INTERPOLATION TABLES.

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TABLE IVA. ARGUMENT $\Delta_o^{IV} + \Delta_r^{IV}$

Amount to be applied to $\Delta_o' + \Delta_r'$, with opposite sign to $\Delta_o^{IV} + \Delta_r^{IV}$

0		198		399		600		801	
2	0	203	37	404	74	605	111	807	148
8	1	209	38	410	75	611	112	812	149
13	2	214	39	415	76	616	113	817	150
19	3	220	40	421	77	622	114	823	151
24	4	225	41	426	78	627	115	828	152
29	5	230	42	432	79	633	116	834	153
35	6	236	43	437	80	638	117	839	154
40	7	241	44	442	81	644	118	845	155
46	8	247	45	448	82	649	119	850	156
51	9	252	46	453	83	654	120	855	157
57	10	258	47	459	84	660	121	861	158
62	11	263	48	464	85	665	122	866	159
67	12	269	49	470	86	671	123	872	160
73	13	274	50	475	87	676	124	877	161
78	14	279	51	480	88	682	125	883	162
84	15	285	52	486	89	687	126	888	163
89	16	290	53	491	90	692	127	894	164
95	17	296	54	497	91	698	128	899	165
100	18	301	55	502	92	703	129	904	166
105	19	307	56	508	93	709	130	910	167
111	20	312	57	513	94	714	131	915	168
116	21	317	58	519	95	720	132	921	169
122	22	323	59	524	96	725	133	926	170
127	23	328	60	529	97	730	134	932	171
133	24	334	61	535	98	736	135	937	172
138	25	339	62	540	99	741	136	942	173
144	26	345	63	546	100	747	137	948	174
149	27	350	64	551	101	752	138	953	175
154	28	355	65	557	102	758	139	959	176
160	29	361	66	562	103	763	140	964	177
165	30	366	67	567	104	769	141	970	178
171	31	372	68	573	105	774	142	975	179
176	32	377	69	578	106	779	143	980	180
182	33	383	70	584	107	785	144	986	181
187	34	388	71	589	108	790	145	991	182
192	35	394	72	595	109	796	146	997	183
198	36	399	73	600	110	801	147	1002	184

In critical cases ascend.

INTERPOLATION TABLES.

TABLE IV. ARGUMENT $\Delta_0^{IV} + \Delta_1^{IV}$

For positive values of the argument.

0	0	0	0	0	0	500	20	36	48	56	59	1000	39	72	97	12	17
10	0	1	1	1	1	510	20	37	49	57	60	1010	40	73	98	13	18
20	1	1	2	2	2	520	20	37	50	58	61	1020	40	73	99	14	20
30	1	2	3	3	4	530	21	38	51	59	62	1030	40	74	0	15	21
40	2	3	4	4	5	540	21	39	52	60	63	1040	41	75	1	16	22
50	2	4	5	6	6	550	22	40	53	62	64	1050	41	76	2	18	23
60	2	4	6	7	7	560	22	40	54	63	66	1060	42	76	2	19	24
70	3	5	7	8	8	570	22	41	55	64	67	1070	42	77	3	20	25
80	3	6	8	9	9	580	23	42	56	65	68	1080	42	78	4	21	27
90	4	6	9	10	11	590	23	42	57	66	69	1090	43	78	5	22	28
100	4	7	10	11	12	600	24	43	58	67	70	1100	43	79	6	23	29
110	4	8	11	12	13	610	24	44	59	68	71	1110	43	80	7	24	30
120	5	9	12	13	14	620	24	45	60	69	73	1120	44	81	8	25	31
130	5	9	13	15	15	630	25	45	61	71	74	1130	44	81	9	27	32
140	5	10	14	16	16	640	25	46	62	72	75	1140	45	82	10	28	34
150	6	11	15	17	18	650	25	47	63	73	76	1150	45	83	11	29	35
160	6	12	15	18	19	660	26	48	64	74	77	1160	45	84	12	30	36
170	7	12	16	19	20	670	26	48	65	75	79	1170	46	84	13	31	37
180	7	13	17	20	21	680	27	49	66	76	80	1180	46	85	14	32	38
190	7	14	18	21	22	690	27	50	67	77	81	1190	47	86	15	33	39
200	8	14	19	22	23	700	27	50	68	78	82	1200	47	86	16	34	41
210	8	15	20	24	25	710	28	51	69	80	83	1210	47	87	17	36	42
220	9	16	21	25	26	720	28	52	70	81	84	1220	48	88	18	37	43
230	9	17	22	26	27	730	29	53	71	82	86	1230	48	89	19	38	44
240	9	17	23	27	28	740	29	53	72	83	87	1240	49	89	20	39	45
250	10	18	24	28	29	750	29	54	73	84	88	1250	49	90	21	40	46
260	10	19	25	29	30	760	30	55	73	85	89	1260	49	91	22	41	48
270	11	19	26	30	32	770	30	55	74	86	90	1270	50	91	23	42	49
280	11	20	27	31	33	780	31	56	75	87	91	1280	50	92	24	43	50
290	11	21	28	32	34	790	31	57	76	88	93	1290	51	93	25	44	51
300	12	22	29	34	35	800	31	58	77	90	94	1300	51	94	26	46	52
310	12	22	30	35	36	810	32	58	78	91	95	1310	51	94	27	47	54
320	13	23	31	36	38	820	32	59	79	92	96	1320	52	95	28	48	55
330	13	24	32	37	39	830	33	60	80	93	97	1330	52	96	29	49	56
340	13	24	33	38	40	840	33	60	81	94	98	1340	53	96	30	50	57
350	14	25	34	39	41	850	33	61	82	95	0	1350	53	97	31	51	58
360	14	26	35	40	42	860	34	62	83	96	1	1360	53	98	31	52	59
370	14	27	36	41	43	870	34	63	84	97	2	1370	54	99	32	53	61
380	15	27	37	43	45	880	34	63	85	99	3	1380	54	99	33	55	62
390	15	28	38	44	46	890	35	64	86	0	4	1390	54	0	34	56	63
400	16	29	39	45	47	900	35	65	87	1	5	1400	55	1	35	57	64
410	16	30	40	46	48	910	36	66	88	2	7	1410	55	2	36	58	65
420	16	30	41	47	49	920	36	66	89	3	8	1420	56	2	37	59	66
430	17	31	42	48	50	930	36	67	90	4	9	1430	56	3	38	60	68
440	17	32	43	49	52	940	37	68	91	5	10	1440	56	4	39	61	69
450	18	32	44	50	53	950	37	68	92	6	11	1450	57	4	40	62	70
460	18	33	44	52	54	960	38	69	93	8	13	1460	57	5	41	64	71
470	18	34	45	53	55	970	38	70	94	9	14	1470	58	6	42	65	72
480	19	35	46	54	56	980	38	71	95	10	15	1480	58	7	43	66	73
490	19	35	47	55	57	990	39	71	96	11	16	1490	58	7	44	67	75

INTERPOLATION TABLES.

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TABLE IV. ARGUMENT $\Delta_0^v + \Delta_1^v$

For positive values of the argument.

1500	59	8	45	68	76	2000	78	44	93	24	34	2500	98	80	42	80	93
1510	59	9	46	69	77	2010	79	45	94	25	36	2510	98	81	43	81	94
1520	60	9	47	70	78	2020	79	45	95	26	37	2520	99	81	44	82	95
1530	60	10	48	71	79	2030	80	46	96	27	38	2530	99	82	45	83	96
1540	60	11	49	72	80	2040	80	47	97	28	39	2540	0	83	46	84	98
1550	61	12	50	74	82	2050	80	48	98	30	40	2550	0	84	47	86	99
1560	61	12	51	75	83	2060	81	48	99	31	41	2560	0	84	48	87	0
1570	62	13	52	76	84	2070	81	49	0	32	43	2570	1	85	48	88	1
1580	62	14	53	77	85	2080	82	50	1	33	44	2580	1	86	49	89	2
1590	62	14	54	78	86	2090	82	50	2	34	45	2590	1	86	50	90	4
1600	63	15	55	79	88	2100	82	51	3	35	46	2600	2	87	51	91	5
1610	63	16	56	80	89	2110	83	52	4	36	47	2610	2	88	52	92	6
1620	63	17	57	81	90	2120	83	53	5	37	48	2620	3	89	53	93	7
1630	64	17	58	83	91	2130	83	53	6	39	50	2630	3	89	54	95	8
1640	64	18	59	84	92	2140	84	54	7	40	51	2640	3	90	55	96	9
1650	65	19	60	85	93	2150	84	55	8	41	52	2650	4	91	56	97	11
1660	65	20	61	86	95	2160	85	56	9	42	53	2660	4	92	57	98	12
1670	65	20	61	87	96	2170	85	56	10	43	54	2670	5	92	58	99	13
1680	66	21	62	88	97	2180	85	57	11	44	55	2680	5	93	59	0	14
1690	66	22	63	89	98	2190	86	58	12	45	57	2690	5	94	60	1	15
1700	67	22	64	90	99	2200	86	58	13	46	58	2700	6	94	61	2	16
1710	67	23	65	92	0	2210	87	59	14	48	59	2710	6	95	62	4	18
1720	67	24	66	93	2	2220	87	60	15	49	60	2720	7	96	63	5	19
1730	68	25	67	94	3	2230	87	61	16	50	61	2730	7	97	64	6	20
1740	68	25	68	95	4	2240	88	61	17	51	62	2740	7	97	65	7	21
1750	69	26	69	96	5	2250	88	62	18	52	64	2750	8	98	66	8	22
1760	69	27	70	97	6	2260	89	63	19	53	65	2760	8	99	67	9	23
1770	69	27	71	98	7	2270	89	63	19	54	66	2770	9	99	68	10	25
1780	70	28	72	99	9	2280	89	64	20	55	67	2780	9	0	69	11	26
1790	70	29	73	0	10	2290	90	65	21	56	68	2790	9	1	70	12	27
1800	71	30	74	2	11	2300	90	66	22	58	70	2800	10	2	71	14	28
1810	71	30	75	3	12	2310	91	66	23	59	71	2810	10	2	72	15	29
1820	71	31	76	4	13	2320	91	67	24	60	72	2820	11	3	73	16	30
1830	72	32	77	5	14	2330	91	68	25	61	73	2830	11	4	74	17	32
1840	72	32	78	6	16	2340	92	68	26	62	74	2840	11	4	75	18	33
1850	72	33	79	7	17	2350	92	69	27	63	75	2850	12	5	76	19	34
1860	73	34	80	8	18	2360	92	70	28	64	77	2860	12	6	77	20	35
1870	73	35	81	9	19	2370	93	71	29	65	78	2870	12	7	77	21	36
1880	74	35	82	11	20	2380	93	71	30	67	79	2880	13	7	78	23	37
1890	74	36	83	12	21	2390	94	72	31	68	80	2890	13	8	79	24	39
1900	74	37	84	13	23	2400	94	73	32	69	81	2900	14	9	80	25	40
1910	75	38	85	14	24	2410	94	74	33	70	82	2910	14	10	81	26	41
1920	75	38	86	15	25	2420	95	74	34	71	84	2920	14	10	82	27	42
1930	76	39	87	16	26	2430	95	75	35	72	85	2930	15	11	83	28	43
1940	76	40	88	17	27	2440	96	76	36	73	86	2940	15	12	84	29	45
1950	76	40	89	18	29	2450	96	76	37	74	87	2950	16	12	85	30	46
1960	77	41	90	20	30	2460	96	77	38	76	88	2960	16	13	86	32	47
1970	77	42	90	21	31	2470	97	78	39	77	89	2970	16	14	87	33	48
1980	78	43	91	22	32	2480	97	79	40	78	91	2980	17	15	88	34	49
1990	78	43	92	23	33	2490	98	79	41	79	92	2990	17	15	89	35	50

INTERPOLATION TABLES.

TABLE IV. ARGUMENT $\Delta_0^{IV} + \Delta_I^{IV}$

For positive values of the argument.

3000	18	16	90	36	52	3500	37	52	38	92	10	4000	57	88	87	48	69
3010	18	17	91	37	53	3510	38	53	39	93	11	4010	57	89	88	49	70
3020	18	17	92	38	54	3520	38	53	40	94	12	4020	58	89	89	50	71
3030	19	18	93	39	55	3530	38	54	41	95	14	4030	58	90	90	51	72
3040	19	19	94	40	56	3540	39	55	42	96	15	4040	58	91	91	52	73
3050	20	20	95	42	57	3550	39	56	43	98	16	4050	59	92	92	54	75
3060	20	20	96	43	59	3560	40	56	44	99	17	4060	59	92	93	55	76
3070	20	21	97	44	60	3570	40	57	45	0	18	4070	59	93	94	56	77
3080	21	22	98	45	61	3580	40	58	46	1	20	4080	60	94	94	57	78
3090	21	22	99	46	62	3590	41	58	47	2	21	4090	60	94	95	58	79
3100	21	23	0	47	63	3600	41	59	48	3	22	4100	61	95	96	59	80
3110	22	24	1	48	64	3610	41	60	49	4	23	4110	61	96	97	60	82
3120	22	25	2	49	66	3620	42	61	50	5	24	4120	61	97	98	61	83
3130	23	25	3	51	67	3630	42	61	51	7	25	4130	62	97	99	63	84
3140	23	26	4	52	68	3640	43	62	52	8	27	4140	62	98	0	64	85
3150	23	27	5	53	69	3650	43	63	53	9	28	4150	63	99	1	65	86
3160	24	28	6	54	70	3660	43	64	54	10	29	4160	63	0	2	66	87
3170	24	28	6	55	71	3670	44	64	55	11	30	4170	63	0	3	67	89
3180	25	29	7	56	73	3680	44	65	56	12	31	4180	64	1	4	68	90
3190	25	30	8	57	74	3690	45	66	57	13	32	4190	64	2	5	69	91
3200	25	30	9	58	75	3700	45	66	58	14	34	4200	65	2	6	70	92
3210	26	31	10	60	76	3710	45	67	59	16	35	4210	65	3	7	72	93
3220	26	32	11	61	77	3720	46	68	60	17	36	4220	65	4	8	73	95
3230	27	33	12	62	79	3730	46	69	61	18	37	4230	66	5	9	74	96
3240	27	33	13	63	80	3740	47	69	62	19	38	4240	66	5	10	75	97
3250	27	34	14	64	81	3750	47	70	63	20	39	4250	67	6	11	76	98
3260	28	35	15	65	82	3760	47	71	64	21	41	4260	67	7	12	77	99
3270	28	35	16	66	83	3770	48	71	65	22	42	4270	67	7	13	78	0
3280	29	36	17	67	84	3780	48	72	65	23	43	4280	68	8	14	79	2
3290	29	37	18	68	86	3790	49	73	66	24	44	4290	68	9	15	80	3
3300	29	38	19	70	87	3800	49	74	67	26	45	4300	69	10	16	82	4
3310	30	38	20	71	88	3810	49	74	68	27	46	4310	69	10	17	83	5
3320	30	39	21	72	89	3820	50	75	69	28	48	4320	69	11	18	84	6
3330	30	40	22	73	90	3830	50	76	70	29	49	4330	70	12	19	85	7
3340	31	40	23	74	91	3840	50	76	71	30	50	4340	70	12	20	86	9
3350	31	41	24	75	93	3850	51	77	72	31	51	4350	70	13	21	87	10
3360	32	42	25	76	94	3860	51	78	73	32	52	4360	71	14	22	88	11
3370	32	43	26	77	95	3870	52	79	74	33	54	4370	71	15	23	89	12
3380	32	43	27	79	96	3880	52	79	75	35	55	4380	72	15	23	91	13
3390	33	44	28	80	97	3890	52	80	76	36	56	4390	72	16	24	92	14
3400	33	45	29	81	98	3900	53	81	77	37	57	4400	72	17	25	93	16
3410	34	46	30	82	0	3910	53	82	78	38	58	4410	73	18	26	94	17
3420	34	46	31	83	1	3920	54	82	79	39	59	4420	73	18	27	95	18
3430	34	47	32	84	2	3930	54	83	80	40	61	4430	74	19	28	96	19
3440	35	48	33	85	3	3940	54	84	81	41	62	4440	74	20	29	97	20
3450	35	48	34	86	4	3950	55	84	82	42	63	4450	74	20	30	98	21
3460	36	49	35	88	5	3960	55	85	83	44	64	4460	75	21	31	0	23
3470	36	50	36	89	7	3970	56	86	84	45	65	4470	75	22	32	1	24
3480	36	51	36	90	8	3980	56	87	85	46	66	4480	76	23	33	2	25
3490	37	51	37	91	9	3990	56	87	86	47	68	4490	76	23	34	3	26

TABLE IV. ARGUMENT $\Delta_0^{\text{IV}} + \Delta_1^{\text{IV}}$

For positive values of the argument.

4500	76	24	35	4	27	5000	96	60	83	60	86	5500	16	96	32	16	45
4510	77	25	36	5	29	5010	96	61	84	61	87	5510	16	97	33	17	46
4520	77	25	37	6	30	5020	97	61	85	62	88	5520	16	97	34	18	47
4530	78	26	38	7	31	5030	97	62	86	63	89	5530	17	98	35	19	48
4540	78	27	39	8	32	5040	98	63	87	64	91	5540	17	99	36	20	49
4550	78	28	40	10	33	5050	98	64	88	66	92	5550	17	0	37	22	50
4560	79	28	41	11	34	5060	98	64	89	67	93	5560	18	0	38	23	52
4570	79	29	42	12	36	5070	99	65	90	68	94	5570	18	1	39	24	53
4580	79	30	43	13	37	5080	99	66	91	69	95	5580	19	2	40	25	54
4590	80	30	44	14	38	5090	99	66	92	70	96	5590	19	2	40	26	55
4600	80	31	45	15	39	5100	0	67	93	71	98	5600	19	3	41	27	56
4610	81	32	46	16	40	5110	0	68	94	72	99	5610	20	4	42	28	57
4620	81	33	47	17	41	5120	1	69	95	73	0	5620	20	5	43	29	59
4630	81	33	48	19	43	5130	1	69	96	75	1	5630	21	5	44	31	60
4640	82	34	49	20	44	5140	1	70	97	76	2	5640	21	6	45	32	61
4650	82	35	50	21	45	5150	2	71	98	77	4	5650	21	7	46	33	62
4660	83	36	51	22	46	5160	2	72	99	78	5	5660	22	8	47	34	63
4670	83	36	52	23	47	5170	3	72	0	79	6	5670	22	8	48	35	64
4680	83	37	52	24	48	5180	3	73	1	80	7	5680	23	9	49	36	66
4690	84	38	53	25	50	5190	3	74	2	81	8	5690	23	10	50	37	67
4700	84	38	54	26	51	5200	4	74	3	82	9	5700	23	10	51	38	68
4710	85	39	55	28	52	5210	4	75	4	84	11	5710	24	11	52	40	69
4720	85	40	56	29	53	5220	5	76	5	85	12	5720	24	12	53	41	70
4730	85	41	57	30	54	5230	5	77	6	86	13	5730	25	13	54	42	71
4740	86	41	58	31	55	5240	5	77	7	87	14	5740	25	13	55	43	73
4750	86	42	59	32	57	5250	6	78	8	88	15	5750	25	14	56	44	74
4760	87	43	60	33	58	5260	6	79	9	89	16	5760	26	15	57	45	75
4770	87	43	61	34	59	5270	7	79	10	90	18	5770	26	15	58	46	76
4780	87	44	62	35	60	5280	7	80	11	91	19	5780	27	16	59	47	77
4790	88	45	63	36	61	5290	7	81	11	92	20	5790	27	17	60	48	79
4800	88	46	64	38	62	5300	8	82	12	94	21	5800	27	18	61	50	80
4810	88	46	65	39	64	5310	8	82	13	95	22	5810	28	18	62	51	81
4820	89	47	66	40	65	5320	8	83	14	96	23	5820	28	19	63	52	82
4830	89	48	67	41	66	5330	9	84	15	97	25	5830	28	20	64	53	83
4840	90	48	68	42	67	5340	9	84	16	98	26	5840	29	20	65	54	84
4850	90	49	69	43	68	5350	10	85	17	99	27	5850	29	21	66	55	86
4860	90	50	70	44	70	5360	10	86	18	0	28	5860	30	22	67	56	87
4870	91	51	71	45	71	5370	10	87	19	1	29	5870	30	23	68	57	88
4880	91	51	72	47	72	5380	11	87	20	3	30	5880	30	23	69	59	89
4890	92	52	73	48	73	5390	11	88	21	4	32	5890	31	24	69	60	90
4900	92	53	74	49	74	5400	12	89	22	5	33	5900	31	25	70	61	91
4910	92	54	75	50	75	5410	12	90	23	6	34	5910	32	26	71	62	93
4920	93	54	76	51	77	5420	12	90	24	7	35	5920	32	26	72	63	94
4930	93	55	77	52	78	5430	13	91	25	8	36	5930	32	27	73	64	95
4940	94	56	78	53	79	5440	13	92	26	9	37	5940	33	28	74	65	96
4950	94	56	79	54	80	5450	14	92	27	10	39	5950	33	28	75	66	97
4960	94	57	80	56	81	5460	14	93	28	12	40	5960	34	29	76	68	98
4970	95	58	81	57	82	5470	14	94	29	13	41	5970	34	30	77	69	0
4980	95	59	82	58	84	5480	15	95	30	14	42	5980	34	31	78	70	1
4990	96	59	82	59	85	5490	15	95	31	15	43	5990	35	31	79	71	2

INTERPOLATION TABLES.

TABLE IV. ARGUMENT $\Delta_0^{\text{IV}} + \Delta_1^{\text{IV}}$

For negative values of the argument.

0	0	0	0	0	0	500	80	64	52	44	41	1000	61	28	3	88	83
10	0	99	99	99	99	510	80	63	51	43	40	1010	60	27	2	87	82
20	99	99	98	98	98	520	80	63	50	42	39	1020	60	27	1	86	80
30	99	98	97	97	96	530	79	62	49	41	38	1030	60	26	0	85	79
40	98	97	96	96	95	540	79	61	48	40	37	1040	59	25	99	84	78
50	98	96	95	94	94	550	78	60	47	38	36	1050	59	24	98	82	77
60	98	96	94	93	93	560	78	60	46	37	34	1060	58	24	98	81	76
70	97	95	93	92	92	570	78	59	45	36	33	1070	58	23	97	80	75
80	97	94	92	91	91	580	77	58	44	35	32	1080	58	22	96	79	73
90	96	94	91	90	89	590	77	58	43	34	31	1090	57	22	95	78	72
100	96	93	90	89	88	600	76	57	42	33	30	1100	57	21	94	77	71
110	96	92	89	88	87	610	76	56	41	32	29	1110	57	20	93	76	70
120	95	91	88	87	86	620	76	55	40	31	27	1120	56	19	92	75	69
130	95	91	87	85	85	630	75	55	39	29	26	1130	56	19	91	73	68
140	95	90	86	84	84	640	75	54	38	28	25	1140	55	18	90	72	66
150	94	89	85	83	82	650	75	53	37	27	24	1150	55	17	89	71	65
160	94	88	85	82	81	660	74	52	36	26	23	1160	55	16	88	70	64
170	93	88	84	81	80	670	74	52	35	25	21	1170	54	16	87	69	63
180	93	87	83	80	79	680	73	51	34	24	20	1180	54	15	86	68	62
190	93	86	82	79	78	690	73	50	33	23	19	1190	53	14	85	67	61
200	92	86	81	78	77	700	73	50	32	22	18	1200	53	14	84	66	59
210	92	85	80	76	75	710	72	49	31	20	17	1210	53	13	83	64	58
220	91	84	79	75	74	720	72	48	30	19	16	1220	52	12	82	63	57
230	91	83	78	74	73	730	71	47	29	18	14	1230	52	11	81	62	56
240	91	83	77	73	72	740	71	47	28	17	13	1240	51	11	80	61	55
250	90	82	76	72	71	750	71	46	27	16	12	1250	51	10	79	60	54
260	90	81	75	71	70	760	70	45	27	15	11	1260	51	9	78	59	52
270	89	81	74	70	68	770	70	45	26	14	10	1270	50	9	77	58	51
280	89	80	73	69	67	780	69	44	25	13	9	1280	50	8	76	57	50
290	89	79	72	68	66	790	69	43	24	12	7	1290	49	7	75	56	49
300	88	78	71	66	65	800	69	42	23	10	6	1300	49	6	74	54	48
310	88	78	70	65	64	810	68	42	22	9	5	1310	49	6	73	53	46
320	87	77	69	64	62	820	68	41	21	8	4	1320	48	5	72	52	45
330	87	76	68	63	61	830	67	40	20	7	3	1330	48	4	71	51	44
340	87	76	67	62	60	840	67	40	19	6	2	1340	47	4	70	50	43
350	86	75	66	61	59	850	67	39	18	5	0	1350	47	3	69	49	42
360	86	74	65	60	58	860	66	38	17	4	99	1360	47	2	69	48	41
370	86	73	64	59	57	870	66	37	16	3	98	1370	46	1	68	47	39
380	85	73	63	57	55	880	66	37	15	1	97	1380	46	1	67	45	38
390	85	72	62	56	54	890	65	36	14	0	96	1390	46	0	66	44	37
400	84	71	61	55	53	900	65	35	13	99	95	1400	45	99	65	43	36
410	84	70	60	54	52	910	64	34	12	98	93	1410	45	98	64	42	35
420	84	70	59	53	51	920	64	34	11	97	92	1420	44	98	63	41	34
430	83	69	58	52	50	930	64	33	10	96	91	1430	44	97	62	40	32
440	83	68	57	51	48	940	63	32	9	95	90	1440	44	96	61	39	31
450	82	68	56	50	47	950	63	32	8	94	89	1450	43	96	60	38	30
460	82	67	56	48	46	960	62	31	7	92	87	1460	43	95	59	36	29
470	82	66	55	47	45	970	62	30	6	91	86	1470	42	94	58	35	28
480	81	65	54	46	44	980	62	29	5	90	85	1480	42	93	57	34	27
490	81	65	53	45	43	990	61	29	4	89	84	1490	42	93	56	33	25

INTERPOLATION TABLES.

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TABLE IV. ARGUMENT $\Delta_0^{IV} + \Delta_1^{IV}$

For negative values of the argument.

1500	41	92	55	32	24	2000	22	56	7	76	66	2500	2	20	58	20	7
1510	41	91	54	31	23	2010	21	55	6	75	64	2510	2	19	57	19	6
1520	40	91	53	30	22	2020	21	55	5	74	63	2520	1	19	56	18	5
1530	40	90	52	29	21	2030	20	54	4	73	62	2530	1	18	55	17	4
1540	40	89	51	28	20	2040	20	53	3	72	61	2540	0	17	54	16	2
1550	39	88	50	26	18	2050	20	52	2	70	60	2550	0	16	53	14	1
1560	39	88	49	25	17	2060	19	52	1	69	59	2560	0	16	52	13	0
1570	38	87	48	24	16	2070	19	51	0	68	57	2570	99	15	52	12	99
1580	38	86	47	23	15	2080	18	50	99	67	56	2580	99	14	51	11	98
1590	38	86	46	22	14	2090	18	50	98	66	55	2590	99	14	50	10	96
1600	37	85	45	21	12	2100	18	49	97	65	54	2600	98	13	49	9	95
1610	37	84	44	20	11	2110	17	48	96	64	53	2610	98	12	48	8	94
1620	37	83	43	19	10	2120	17	47	95	63	52	2620	97	11	47	7	93
1630	36	83	42	17	9	2130	17	47	94	61	50	2630	97	11	46	5	92
1640	36	82	41	16	8	2140	16	46	93	60	49	2640	97	10	45	4	91
1650	35	81	40	15	7	2150	16	45	92	59	48	2650	96	9	44	3	89
1660	35	80	39	14	5	2160	15	44	91	58	47	2660	96	8	43	2	88
1670	35	80	39	13	4	2170	15	44	90	57	46	2670	95	8	42	1	87
1680	34	79	38	12	3	2180	15	43	89	56	45	2680	95	7	41	0	86
1690	34	78	37	11	2	2190	14	42	88	55	43	2690	95	6	40	99	85
1700	33	78	36	10	1	2200	14	42	87	54	42	2700	94	6	39	98	84
1710	33	77	35	8	0	2210	13	41	86	52	41	2710	94	5	38	96	82
1720	33	76	34	7	98	2220	13	40	85	51	40	2720	93	4	37	95	81
1730	32	75	33	6	97	2230	13	39	84	50	39	2730	93	3	36	94	80
1740	32	75	32	5	96	2240	12	39	83	49	38	2740	93	3	35	93	79
1750	31	74	31	4	95	2250	12	38	82	48	36	2750	92	2	34	92	78
1760	31	73	30	3	94	2260	11	37	81	47	35	2760	92	1	33	91	77
1770	31	73	29	2	93	2270	11	37	81	46	34	2770	91	1	32	90	75
1780	30	72	28	1	91	2280	11	36	80	45	33	2780	91	0	31	89	74
1790	30	71	27	0	90	2290	10	35	79	44	32	2790	91	99	30	88	73
1800	29	70	26	98	89	2300	10	34	78	42	30	2800	90	98	29	86	72
1810	29	70	25	97	88	2310	9	34	77	41	29	2810	90	98	28	85	71
1820	29	69	24	96	87	2320	9	33	76	40	28	2820	89	97	27	84	70
1830	28	68	23	95	86	2330	9	32	75	39	27	2830	89	96	26	83	68
1840	28	68	22	94	84	2340	8	32	74	38	26	2840	89	96	25	82	67
1850	28	67	21	93	83	2350	8	31	73	37	25	2850	88	95	24	81	66
1860	27	66	20	92	82	2360	8	30	72	36	23	2860	88	94	23	80	65
1870	27	65	19	91	81	2370	7	29	71	35	22	2870	88	93	23	79	64
1880	26	65	18	89	80	2380	7	29	70	33	21	2880	87	93	22	77	63
1890	26	64	17	88	79	2390	6	28	69	32	20	2890	87	92	21	76	61
1900	26	63	16	87	77	2400	6	27	68	31	19	2900	86	91	20	75	60
1910	25	62	15	86	76	2410	6	26	67	30	18	2910	86	90	19	74	59
1920	25	62	14	85	75	2420	5	26	66	29	16	2920	86	90	18	73	58
1930	24	61	13	84	74	2430	5	25	65	28	15	2930	85	89	17	72	57
1940	24	60	12	83	73	2440	4	24	64	27	14	2940	85	88	16	71	55
1950	24	60	11	82	71	2450	4	24	63	26	13	2950	84	88	15	70	54
1960	23	59	10	80	70	2460	4	23	62	24	12	2960	84	87	14	68	53
1970	23	58	10	79	69	2470	3	22	61	23	11	2970	84	86	13	67	52
1980	22	57	9	78	68	2480	3	21	60	22	9	2980	83	85	12	66	51
1990	22	57	8	77	67	2490	2	21	59	21	8	2990	83	85	11	65	50

INTERPOLATION TABLES.

TABLE IV. ARGUMENT $\Delta_0^{\text{IV}} + \Delta_1^{\text{IV}}$

For negative values of the argument.

3000	82	84	10	64	48	3500	63	48	62	8	90	4000	43	12	13	52	31
3010	82	83	9	63	47	3510	62	47	61	7	89	4010	43	11	12	51	30
3020	82	83	8	62	46	3520	62	47	60	6	88	4020	42	11	11	50	29
3030	81	82	7	61	45	3530	62	46	59	5	86	4030	42	10	10	49	28
3040	81	81	6	60	44	3540	61	45	58	4	85	4040	42	9	9	48	27
3050	80	80	5	58	43	3550	61	44	57	2	84	4050	41	8	8	46	25
3060	80	80	4	57	41	3560	60	44	56	1	83	4060	41	8	7	45	24
3070	80	79	3	56	40	3570	60	43	55	0	82	4070	41	7	6	44	23
3080	79	78	2	55	39	3580	60	42	54	99	80	4080	40	6	6	43	22
3090	79	78	1	54	38	3590	59	42	53	98	79	4090	40	6	5	42	21
3100	79	77	0	53	37	3600	59	41	52	97	78	4100	39	5	4	41	20
3110	78	76	99	52	36	3610	59	40	51	96	77	4110	39	4	3	40	18
3120	78	75	98	51	34	3620	58	39	50	95	76	4120	39	3	2	39	17
3130	77	75	97	49	33	3630	58	39	49	93	75	4130	38	3	1	37	16
3140	77	74	96	48	32	3640	57	38	48	92	73	4140	38	2	0	36	15
3150	77	73	95	47	31	3650	57	37	47	91	72	4150	37	1	99	35	14
3160	76	72	94	46	30	3660	57	36	46	90	71	4160	37	0	98	34	13
3170	76	72	94	45	29	3670	56	36	45	89	70	4170	37	0	97	33	11
3180	75	71	93	44	27	3680	56	35	44	88	69	4180	36	99	96	32	10
3190	75	70	92	43	26	3690	55	34	43	87	68	4190	36	98	95	31	9
3200	75	70	91	42	25	3700	55	34	42	86	66	4200	35	98	94	30	8
3210	74	69	90	40	24	3710	55	33	41	84	65	4210	35	97	93	28	7
3220	74	68	89	39	23	3720	54	32	40	83	64	4220	35	96	92	27	5
3230	73	67	88	38	21	3730	54	31	39	82	63	4230	34	95	91	26	4
3240	73	67	87	37	20	3740	53	31	38	81	62	4240	34	95	90	25	3
3250	73	66	86	36	19	3750	53	30	37	80	61	4250	33	94	89	24	2
3260	72	65	85	35	18	3760	53	29	36	79	59	4260	33	93	88	23	1
3270	72	65	84	34	17	3770	52	29	35	78	58	4270	33	93	87	22	0
3280	71	64	83	33	16	3780	52	28	35	77	57	4280	32	92	86	21	98
3290	71	63	82	32	14	3790	51	27	34	76	56	4290	32	91	85	20	97
3300	71	62	81	30	13	3800	51	26	33	74	55	4300	31	90	84	18	96
3310	70	62	80	29	12	3810	51	26	32	73	54	4310	31	90	83	17	95
3320	70	61	79	28	11	3820	50	25	31	72	52	4320	31	89	82	16	94
3330	70	60	78	27	10	3830	50	24	30	71	51	4330	30	88	81	15	93
3340	69	60	77	26	9	3840	50	24	29	70	50	4340	30	88	80	14	91
3350	69	59	76	25	7	3850	49	23	28	69	49	4350	30	87	79	13	90
3360	68	58	75	24	6	3860	49	22	27	68	48	4360	29	86	78	12	89
3370	68	57	74	23	5	3870	48	21	26	67	46	4370	29	85	77	11	88
3380	68	57	73	21	4	3880	48	21	25	65	45	4380	28	85	77	9	87
3390	67	56	72	20	3	3890	48	20	24	64	44	4390	28	84	76	8	86
3400	67	55	71	19	2	3900	47	19	23	63	43	4400	28	83	75	7	84
3410	66	54	70	18	0	3910	47	18	22	62	42	4410	27	82	74	6	83
3420	66	54	69	17	99	3920	46	18	21	61	41	4420	27	82	73	5	82
3430	66	53	68	16	98	3930	46	17	20	60	39	4430	26	81	72	4	81
3440	65	52	67	15	97	3940	46	16	19	59	38	4440	26	80	71	3	80
3450	65	52	66	14	96	3950	45	16	18	58	37	4450	26	80	70	2	79
3460	64	51	65	12	95	3960	45	15	17	56	36	4460	25	79	69	0	77
3470	64	50	64	11	93	3970	44	14	16	55	35	4470	25	78	68	99	76
3480	64	49	64	10	92	3980	44	13	15	54	34	4480	24	77	67	98	75
3490	63	49	63	9	91	3990	44	13	14	53	32	4490	24	77	66	97	74

TABLE IV. ARGUMENT $\Delta_o^{IV} + \Delta_1^{IV}$

For negative values of the argument.

4500	24	76	65	96	73	5000	4	40	17	40	14	5500	84	4	68	84	55
4510	23	75	64	95	71	5010	4	39	16	39	13	5510	84	3	67	83	54
4520	23	75	63	94	70	5020	3	39	15	38	12	5520	84	3	66	82	53
4530	22	74	62	93	69	5030	3	38	14	37	11	5530	83	2	65	81	52
4540	22	73	61	92	68	5040	2	37	13	36	9	5540	83	1	64	80	51
4550	22	72	60	90	67	5050	2	36	12	34	8	5550	83	0	63	78	50
4560	21	72	59	89	66	5060	2	36	11	33	7	5560	82	0	62	77	48
4570	21	71	58	88	64	5070	1	35	10	32	6	5570	82	99	61	76	47
4580	21	70	57	87	63	5080	1	34	9	31	5	5580	81	98	60	75	46
4590	20	70	56	86	62	5090	1	34	8	30	4	5590	81	98	60	74	45
4600	20	69	55	85	61	5100	0	33	7	29	2	5600	81	97	59	73	44
4610	19	68	54	84	60	5110	0	32	6	28	1	5610	80	96	58	72	43
4620	19	67	53	83	59	5120	99	31	5	27	0	5620	80	95	57	71	41
4630	19	67	52	81	57	5130	99	31	4	25	99	5630	79	95	56	69	40
4640	18	66	51	80	56	5140	99	30	3	24	98	5640	79	94	55	68	39
4650	18	65	50	79	55	5150	98	29	2	23	96	5650	79	93	54	67	38
4660	17	64	49	78	54	5160	98	28	1	22	95	5660	78	92	53	66	37
4670	17	64	48	77	53	5170	97	28	0	21	94	5670	78	92	52	65	36
4680	17	63	48	76	52	5180	97	27	99	20	93	5680	77	91	51	64	34
4690	16	62	47	75	50	5190	97	26	98	19	92	5690	77	90	50	63	33
4700	16	62	46	74	49	5200	96	26	97	18	91	5700	77	90	49	62	32
4710	15	61	45	72	48	5210	96	25	96	16	89	5710	76	89	48	60	31
4720	15	60	44	71	47	5220	95	24	95	15	88	5720	76	88	47	59	30
4730	15	59	43	70	46	5230	95	23	94	14	87	5730	75	87	46	58	29
4740	14	59	42	69	45	5240	95	23	93	13	86	5740	75	87	45	57	27
4750	14	58	41	68	43	5250	94	22	92	12	85	5750	75	86	44	56	26
4760	13	57	40	67	42	5260	94	21	91	11	84	5760	74	85	43	55	25
4770	13	57	39	66	41	5270	93	21	90	10	82	5770	74	85	42	54	24
4780	13	56	38	65	40	5280	93	20	89	9	81	5780	73	84	41	53	23
4790	12	55	37	64	39	5290	93	19	89	8	80	5790	73	83	40	52	21
4800	12	54	36	62	38	5300	92	18	88	6	79	5800	73	82	39	50	20
4810	12	54	35	61	36	5310	92	18	87	5	78	5810	72	82	38	49	19
4820	11	53	34	60	35	5320	92	17	86	4	77	5820	72	81	37	48	18
4830	11	52	33	59	34	5330	91	16	85	3	75	5830	72	80	36	47	17
4840	10	52	32	58	33	5340	91	16	84	2	74	5840	71	80	35	46	16
4850	10	51	31	57	32	5350	90	15	83	1	73	5850	71	79	34	45	14
4860	10	50	30	56	30	5360	90	14	82	0	72	5860	70	78	33	44	13
4870	9	49	29	55	29	5370	90	13	81	99	71	5870	70	77	32	43	12
4880	9	49	28	53	28	5380	89	13	80	97	70	5880	70	77	31	41	11
4890	8	48	27	52	27	5390	89	12	79	96	68	5890	69	76	31	40	10
4900	8	47	26	51	26	5400	88	11	78	95	67	5900	69	75	30	39	9
4910	8	46	25	50	25	5410	88	10	77	94	66	5910	68	74	29	38	7
4920	7	46	24	49	23	5420	88	10	76	93	65	5920	68	74	28	37	6
4930	7	45	23	48	22	5430	87	9	75	92	64	5930	68	73	27	36	5
4940	6	44	22	47	21	5440	87	8	74	91	63	5940	67	72	26	35	4
4950	6	44	21	46	20	5450	86	8	73	90	61	5950	67	72	25	34	3
4960	6	43	20	44	19	5460	86	7	72	88	60	5960	66	71	24	32	2
4970	5	42	19	43	18	5470	86	6	71	87	59	5970	66	70	23	31	0
4980	5	41	18	42	16	5480	85	5	70	86	58	5980	66	69	22	30	99
4990	4	41	18	41	15	5490	85	5	69	85	57	5990	65	69	21	29	98

PROPER NAMES.

<i>Achernar</i>	α Eridani	<i>Denebola</i>	β Leonis
<i>Aldebaran</i>	α Tauri	<i>Dubhe</i>	α Ursæ Majoris
<i>Algenib</i>	γ Pegasi	<i>Fomalhaut</i>	α Piscis Australis
<i>Algol</i>	β Persei	<i>Markab</i>	α Pegasi
<i>Altair</i>	α Aquilæ	<i>Mira</i>	\circ Ceti
<i>Antares</i>	α Scorpii	<i>Polaris</i>	α Ursæ Minoris
<i>Arcturus</i>	α Bootis	<i>Pollux</i>	β Geminorum
<i>Bellatrix</i>	γ Orionis	<i>Procyon</i>	α Canis Minoris
<i>Betelgeuse</i>	α Orionis	<i>Regulus</i>	α Leonis
<i>Canopus</i>	α Argus	<i>Rigel</i>	β Orionis
<i>Capella</i>	α Aurigæ	<i>Sirius</i>	α Canis Majoris
<i>Castor</i>	α Geminorum	<i>Spica</i>	α Virginis
<i>Deneb</i>	α Cygni	<i>Vega</i>	α Lyræ

Mean places of stars between declinations $+80^\circ$ and -80° are given on pages 292-302 and of circumpolar stars on page 303. The page numbers given below are the pages on which the apparent places are to be found.

Name.	Cat. No.	Page.	Name.	Cat. No.	Page.	Name.	Cat. No.	Page.	Name.	Cat. No.	Page.
Andromedæ			Aquarii			Argus			Arietis		
α	3	354	λ	1428	510	α	396	397	α	125	367
β	69	361	μ	1293	498	β	566	414	β	114	365
γ	124	366	ξ	1338	503	γ	498	408	δ	187	374
δ	36	358	σ	1404	507	δ	531	411	ϵ	175	372
ϵ	35	357	ψ^1	1455	513	ϵ	508	409	θ	135	368
μ	55	360	c^2	1444	512	ζ	492	407	σ	170	372
Antlæ			Aquilæ			η	658	424	τ^1	197	375
α	636	422	α	1218	490	θ	656	423	Aurigæ		
ι	668	425	β	1222	491	ι	570	415	α	319	388
Apodis			γ	1214	490	κ	573	416	β	368	394
α	881	451	δ	1185	487	λ	560	414	ϵ	301	386
γ	998	463	ϵ	1158	484	μ	660	424	η	307	386
Aquarii			ζ	1160	484	ν	406	398	θ	369	395
α	1370	504	θ	1237	493	ξ	475	406	ι	299	385
β	1332	502	λ	1162	485	π	445	403	Bootis		
γ	1391	506	μ	1197	488	ρ	495	408	α	852	448
δ	1430	510	ω	1177	487	σ	457	404	β	906	453
ϵ	1287	498	Aræ			τ	419	400	γ	870	449
η	1409	507	α	1064	472	υ	600	419	δ	919	455
θ	1386	506	β	1055	471	ψ	580	416	ϵ	885	451
κ	1410	507	ζ	1031	468				η	832	445

Mean places of stars between declinations + 80° and - 80° are given on pages 292-302 and of circumpolar stars on page 303. The page numbers given below are the pages on which the apparent places are to be found.

Name.	Cat. No.	Page.	Name.	Cat. No.	Page.	Name.	Cat. No.	Page.	Name.	Cat. No.	Page.
Bootis			Cassiopeia			Chamaeleontis			Doradus		
ρ	869	449	α	37	358	β	742	434	β	345	392
τ	824	444	β	4	354						
ψ	910	454	γ	53	359	Circini			Draconis		
f	863	449	δ	83	362	α	877	450	α	845	447
			ϵ	111	365				β	1067	473
Camelopardalis						Columbae			γ	1095	476
9	293	385	Centauri			α	349	392	δ	1173	486
			α	875	450	β	362	394	ϵ	1219	491
Cancer			β	841	446				ζ	1042	470
α	543	413	γ	768	437	Comae			η	1001	463
β	503	409	δ	733	432	31	778	439	ι	931	457
γ	527	411	ϵ	819	443				κ	760	436
η	517	410	ζ	831	445	Coronae Australis			λ	701	429
κ	556	413	η	873	450	α	1163	485	χ	1123	480
ξ	559	413	θ	843	447						
d^1	507	409	ι	803	442	Coronae Borealis					
83	569	414	κ	902	453	α	943	458	Equulei		
			λ	704	429				α	1318	500
Canis Majoris			μ	828	445						
α	411	399	B	719	431	Corvi					
β	394	397				β	761	436	Eridani		
γ	430	402	Cephei			γ	740	434	α	96	363
δ	433	402	α	1324	501	δ	755	435	β	310	387
ϵ	426	400	β	1333	502	ϵ	735	433	γ	240	380
ζ	389	396	γ	1480	515				δ	221	378
η	452	404	ζ	1381	505	Crateris			ϵ	210	376
θ	422	400	η	1288	497	β	682	427	θ	176	372
σ^a	429	401	ι	1424	509	δ	690	428	μ	288	384
22	427	401	39 H	1468	322				σ^1	251	381
			51 H	434	306				τ^5	212	377
Canis Minoris						Crucis			v^4	261	382
α	466	405	Ceti			α	748	435	ϕ	134	368
β	453	404	α	179	373	β	775	438	53	282	384
			β	39	358	γ	757	435			
Canum Venat.			γ	163	371	δ	738	433	Fornacis		
12	786	440	δ	154	370				β	169	371
			ζ	109	364	Cygni			κ	137	369
Capricorni			θ	81	362	α	1281	497			
α^2	1251	494	ι	16	355	β^1	1193	488	Geminorum		
β	1252	494	ν	150	370	γ	1255	494	α	458	405
δ	1349	503	ξ^1	130	367	δ	1213	490	β	470	406
ζ	1328	502	ξ^2	143	370	ϵ	1284	497	γ	403	398
θ	1305	499	σ	136	369	ζ	1314	500	δ	447	403
ι	1325	501	π	164	371	61	1308	499	ϵ	408	398
ρ	1258	495	v	120	366				ζ	428	401
4	1250	493	2	1504	354	Delphini			η	381	396
			12	25	357	α	1277	496	μ	390	396
Carinae			20	52	359	ϵ	1267	495	v	399	397
Q	463	405	67	133	368				ξ	409	399
q	625	421				Doradus			χ	489	407
						α	279	383	ι	373	395
									51	439	402

Mean places of stars between declinations $+80^\circ$ and -80° are given on pages 292-302 and of circumpolar stars on page 303. The page numbers given below are the pages on which the apparent places are to be found.

Name.	Cat. No.	Page.	Name.	Cat. No.	Page.	Name.	Cat. No.	Page.	Name.	Cat. No.	Page.
Groombridge			Leonis			Microscopii			Orionis		
3548	1321	320	α	617	420	γ	1301	499	α	365	394
			β	717	430	θ^1	1323	500	β	318	388
Gruis			γ	627	421	Monocerotis			γ	330	389
α	1374	505	δ	683	427				δ	336	390
β	1416	508	ϵ	597	418	26	468	406	ϵ	344	391
γ	1356	504	θ	684	428	30	509	410	ζ	350	393
ϵ	1421	509	μ	603	419				η	328	389
			ξ	583	417	Muscae			ι	343	391
			\circ	594	418	α	764	436	κ	357	393
Herculis			π	612	420	β	773	438	ν	377	395
α	1045	470	ρ	641	423	δ	787	440	\circ	327	388
β	1005	464	τ	697	428				π^3	291	385
γ	992	463	u	706	430						
δ	1046	470	χ	677	426	Normae			Pavonis		
ϵ	1036	469	\dot{a}	672	425	γ	986	462	α	1256	495
ζ	1017	466	l	662	424				β	1279	496
η	1018	466	Leporis			Octantis			γ	1327	501
μ	1084	475	α	338	391	β	1417	352	δ	1233	493
π	1047	471	β	333	390	δ	855	340	ϵ	1223	492
89	1091	476	ϵ	308	387	η	676	338	ζ	1133	481
			μ	316	387	\circ	13	324	η	1079	474
			Librae			ρ	935	342	λ	1145	482
Horologii			α	891	452	σ	1207	346			
α	256	381	β	920	456	u	1390	350	Pegasi		
μ	183	374	ι	915	455	A	462	334	α	1438	511
45 G	211	376	ξ^2	899	452	9 B	149	326	β	1437	511
Hydrae			\circ^2	926	456	10 B	173	328	γ	10	355
α	576	416	2	860	448	12 B	374	332	ϵ	1345	503
γ	802	441	32	933	457	10 G	649	336	ζ	1415	508
ϵ	532	412	Lupi			44 G	1212	344	η	1418	508
ζ	539	412	α	878	451	48 G	1260	348	ι	1375	505
κ	593	418	β	901	453	Ophiuchi			μ	1423	509
μ	633	422	γ	941	458	α	1070	473	τ	1457	513
ν	663	425	δ	923	456	β	1080	475	ϕ	1491	516
ξ	702	429	ζ	914	454	δ	983	461	16	1357	504
π	842	446	Lyncis			ϵ	987	462	72	1471	514
			40	571	415	ζ	1013	465			
Hydri			Lyræ			η	1040	469	Persei		
α	119	366	α	1134	480	θ	1052	471	α	200	375
β	22	356	β	1147	482	κ	1034	468	β	185	374
γ	234	379	γ	1157	483	λ	1006	464	γ	181	373
δ	138	369	Mensae			ν	1096	477	δ	218	377
			31 G	359	330	σ	1060	472	ϵ	238	379
Indi						20	1024	467	ζ	235	379
α	1270	496				30	1035	468	ρ	182	373
						72	1105	477			

Mean places of stars between declinations $+80^{\circ}$ and -80° are given on pages 292-302 and of circumpolar stars on page 303. The page numbers given below are the pages on which the apparent places are to be found.

Name.	Cat. No.	Page.	Name.	Cat. No.	Page.	Name.	Cat. No.	Page.	Name.	Cat. No.	Page.
Phoenicis			Sagittarii			Sextantis			Ursæ Majoris		
α	23	357	μ	1109	478	22	624	421	μ	628	422
β	63	361	ξ	1155	483	34	654	423	σ	512	410
γ	85	363	π	1166	486				ν	601	419
ι	1474	514	σ	1150	483	Taurn			ψ	680	427
Pictoris			τ	1161	485	α	278	383	Ursæ Minoris		
α	417	399	ϕ	1138	481	β	331	389	α	95	304
20 G	335	390	ψ	1172	486	γ	262	382	β	896	452
Piscis Australis			c	1231	492	ϵ	270	383	γ	928	457
α	1431	510	f	1211	489	ζ	346	392	δ	1097	316
Piscium			g	1227	492	η	228	378	ϵ	1032	314
β	1436	511	h	1198	489	ι	305	386	ζ	957	459
γ	1453	512	30	1146	482	λ	241	380	λ	1153	318
δ	47	359	54	1203	489	σ	201	375	4 B	511	308
ϵ	59	360	Scorpii			τ	284	384	6 B	743	310
ζ	74	362	α	1002	464	A	244	380	57 B	909	312
η	88	363	β	972	461	f	207	376	Velorum		
ι	1479	514	γ	907	454	11	217	377	N	584	417
κ	1464	513	δ	967	461	17	224	378	q	619	420
λ	1482	515	ϵ	1023	467	43	249	381	Virginis		
ν	99	364	η	1041	469	130	354	393	α	806	442
σ	104	364	θ	1071	474	Telescopii			β	718	431
ω	1500	516	ι	1081	475	α	1120	479	γ	769	437
d	18	356	κ	1075	474	59 G	1186	487	δ	784	440
27	1498	516	λ	1066	473	Trianguli			ϵ	788	441
44	21	356	μ	1026	467	α	110	365	ζ	814	443
72	61	361	π	964	460	β	126	367	η	744	434
Puppis			σ	989	462	Trianguli Aust.			θ	792	441
9	478	407	τ	1008	465	α	1019	466	κ	849	448
20	500	408	ν	1063	472	β	959	460	ν	712	430
Pyxidis			G	1086	476	γ	918	455	σ	730	432
α	529	411	24	1016	465	Tucanæ			π	726	432
θ	572	415	Sculptoris			α	1387	506	ρ	770	437
Reticuli			α	57	360	γ	1452	512	τ	839	446
α	259	382	δ	1488	515	ζ	17	355	ψ	781	439
Sagittarii			Scuti			Ursæ Majoris			i	807	443
γ	1103	477	4 H	1136	481	α	675	426	m	821	444
δ	1114	478	Serpentis			β	674	426	35	776	438
ϵ	1118	479	α	951	458	γ	722	431	94	844	447
ζ	1159	484	γ	963	460	δ	739	433	Volantis		
η	1111	478	ϵ	958	459	ϵ	782	439	δ	449	403
ι	1221	491	η	1116	479	ζ	805	442	Vulpeculæ		
λ	1125	480	μ	955	459	η	826	444	6	1190	488
						θ	581	417	32	1296	498
						ι	542	412			

In the following index the subject should be searched for under its principal noun, e.g. *Moon, phases of* and not *Phases of Moon*, or *Day, Julian* rather than *Julian Day*. The references given are usually to the tabular matter only, so that in many cases the information sought will be obtained by turning to the pages in the Explanation (pages 753-801) covering the tabular matter concerned.

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